



92Sh122

C

Columbia College
in the City of New York.
Library.



From the Bequest
of
F. A. P. Barnard, LL. D.
Pres. of Columbia College, 1864-1889.
and
Mrs. M. M. Barnard.



LIFE AND CORRESPONDENCE

OF

ABRAHAM SHARP.



HORTON HALL AND SHARP'S OBSERVATORY.

(From a sketch by the REV. J. L. PETIT, M.A.)

COLL
LIVE
LIBR

LIFE AND CORRESPONDENCE
OF
ABRAHAM SHARP,

*The Yorkshire Mathematician and Astronomer,
and Assistant of Flamsteed;*

WITH
MEMORIALS OF HIS FAMILY,
AND ASSOCIATED FAMILIES.

BY WILLIAM CUDWORTH,

Author of "Round About Bradford," &c.

London:

SAMPSON LOW, MARSTON, SEARLE & RIVINGTON, LTD.,
ST. DUNSTON'S HOUSE, FETTER LANE, E.C.

BRADFORD: THOS. BREAR & CO., LIMITED, KIRKGATE.

1889.

ENTERED AT STATIONERS' HALL.

All Rights Reserved.

TO EDWARD HAILSTONE, ESQ., F.S.A.

*THIS VOLUME IS
RESPECTFULLY DEDICATED BY THE AUTHOR,*

IN HUMBLE RECOGNITION OF

THE LIFE-LONG CARE HE HAS BESTOWED IN THE PRESERVATION
OF EVIDENCES OF THE SHARP FAMILY;

OF THE WILLING HELP HE HAS RENDERED THE AUTHOR
IN THE PREPARATION OF THIS VOLUME;

AND OF HIS VALUABLE SERVICES TO ARCHÆOLOGY GENERALLY.

244216

CONTENTS.

CHAPTER I.

	PAGE
Some account of the Sharp family—Pedigree of the family— Abraham Sharp's early days—His apprenticeship—Goes to London—Appointed assistant to Flamsteed, first Astronomer- Royal—His career at Greenwich Observatory—Sharp fits up the Mural Arc—Description of its construction—Assists Flam- steed in making astronomical observations—Sharp's removal from Greenwich to Portsmouth—His return to Horton	1—22

CHAPTER II.

Abraham Sharp at Horton—His correspondence with Parsons, Speidell, and Halley—The mathematical chair at Christ's Hospital—Death of John Sharp, M.D.—Abraham Sharp suc- ceeds to the family estates—Continues his mechanical opera- tions and mathematical studies—Notice of Flamsteed, the first Astronomer-Royal—His appointment to take charge of Green- wich Observatory—His controversy with Sir Isaac Newton— His contributions towards the elucidation of Newton's theory of the Law of Gravitation—Rupture between Flamsteed and Newton—Preparation of the <i>Historia Cœlestis</i> —Difficulties in the way of its publication charged upon Sir Isaac Newton and Dr. Halley.....	23—55
---	-------

CHAPTER III.

Correspondence between the Rev. John Flamsteed and Abraham Sharp—Sharp's invention of a "way-wiser," or measuring wheel —The latitude of Horton—Newton's <i>Principia</i> —The Aurora	
---	--

Borealis, a "remarkable phenomenon"—Destructive hurricane in 1703—Newton's "Treatise of Light and Colours"—Flamsteed's criticism of the work—Sir Isaac Newton knighted—Slow progress of the <i>Historia Cælestis</i> —Mr. Kirke, F.R.S.—Lunar Rainbow—Flamsteed's observations of Saturn and Jupiter—Abraham Sharp offered the mathematical chair of Christ's Hospital—Sir Isaac Newton stops the printing of the <i>Historia Cælestis</i> —Remarkable meteor seen at Horton—Dr. Halley and the <i>Historia Cælestis</i> —Sir Isaac Newton and Flamsteed—Second edition of the <i>Principia</i> : Flamsteed's criticism—The problem of "finding the longitude"—Ralph Thoresby and Abraham Sharp—Death of Lord Halifax—The "Dancing Sisters"—The Aurora Borealis again seen at Horton—The Rebellion of 1715: consternation at Bradford—Flamsteed destroys Halley's spurious edition of the <i>Historia Cælestis</i> —Sir Hans Sloane—Declining health of Flamsteed—Flamsteed's last letter to Abraham Sharp—Sharp's last letter to Flamsteed—Death of Flamsteed	56—132
--	--------

CHAPTER IV.

Abraham Sharp and Joseph Crosthwait undertake the completion of the <i>Historia Cælestis</i> —Vexatious delays in the publication—Letters from Crosthwait to Sharp—Completion of the <i>Historia Cælestis</i> —The ingratitude of Mrs. Flamsteed—Description and contents of the <i>Historia Cælestis</i> —Abraham Sharp's share in its compilation	133—150
---	---------

CHAPTER V.

Abraham Sharp's life at Horton—His youthful devotion to the science of astronomy—Had no sympathy with astrology—His charitable disposition—His gifts to pious and charitable purposes—His careful habits—His mathematical accuracy—Description of Horton Hall—Remains of the old timber-built house—Drawing of the structure—Sharp's study and observatory—Novel mode of admitting visitors—Sharp's recluse habits—Rev. Oliver Heywood at Horton Hall—Sundial, engraved by Sharp, found at Meanwood—The Priestley family—Sharp's mechanical genius—His attempt at "squaring the circle"—Sharp works out the problem to seventy-two places—Van Ceulen's attempt compared—He also improves the system of
--

Contents.

ix.

	PAGE
logarithms—His contributions to Sherwin's Mathematical Tables—Henry Briggs, Savilian Professor of Geometry at Oxford—Jesse Ramsden, mathematical instrument maker—Anecdote of Sir John Herschel—Sharp's "Geometry Improved"—Correspondence relating to it.....	151—182

CHAPTER VI.

Abraham Sharp's life at Horton, continued—Bradford society in 1700—Letters of Mr. Sharp to his grand-niece, Faith Stansfield—Her marriage to Richard Gilpin Sawrey—Letters of Mr. Sharp to the latter—The Presbyterian interest at Horton—Erection of a meeting-house at Chapel Green—Abraham Sharp a Presbyterian—Letter from Ralph Thoresby—The Stretton Fund—Lady Hewley's Charity—Growth of the Horton congregation—Erection of a Presbyterian Chapel at Bradford—Rupture in 1730—Letter from Mr. Sawrey—Death of Abraham Sharp—Persons invited to his funeral—Monument in Bradford Parish church—Copy of his will—Singular incident in connection therewith—Inventory of Abraham Sharp's instruments and tools—Remarks on existing specimens	183—215
---	---------

CHAPTER VII.

JOHN SHARP, PARLIAMENTARIAN.

His birth in 1604—A clothier and merchant—Steward of the rectorial tithes of Bradford—His activity on the side of Parliament during the Civil Wars—The siege of Bradford—Disastrous results to the town—Fairfax and the Western campaign—John Sharp accompanies him as financial secretary—Extracts from his account book—Close of the campaign—Sharp receives two certificates with gold medal from the Parliament— <i>Fac-simile</i> of certificate of 1647—Domestic life of John Sharp—His death in 1672—Copy of his will	219—236
--	---------

CHAPTER VIII.

REV. THOMAS SHARP, M.A.

Born October 30, 1633—Educated at Bradford Grammar School—Entered Clare Hall, Cambridge—Letter from his mother—	
---	--

	PAGE
Samuel Sharp, also a student at Clare Hall—Thomas Sharp enters holy orders—Ejected for his nonconformity—Returns to Horton Hall, for which he obtained a preaching licence—Partially rebuilt Horton Hall after his father's death in 1672—Minister at Morley, and afterwards at Mill Hill Chapel, Leeds—Died August, 1693—Inventory of his goods—Extracts from his account books—Thomas Sharp's will—Will of Faith Sharp, his widow	237—246

CHAPTER IX.

THE FAMILY OF JOHN SHARP, THE ROYALIST.

John Sharp, the Royalist—His possessions—A distinguished partisan of Charles I.—His relics at Horton Old Hall—Lieutenant Isaac Sharp, his son and heir—Held commissions in 1663, 1673, and 1688—Added considerably to the paternal estate—Rebuilt Horton Old Hall—His death at ninety years of age—Isaac Sharp, his son—Recital of his will—Indenture showing his possessions—The Stapletons and Bridges—Thomas Bridges, a noted antiquary, and friend of Thoresby—Francis Bridges, his son, great collector of coins—Francis Sharp Bridges—Rev. Benjamin Powell—Francis Sharp Powell, M.P.—Description of Horton Old Hall—Its valuable collection of books and MSS.—Pedigree of F. S. Powell	247—258
---	---------

CHAPTER X.

ARCHBISHOP SHARP, AND HIS FAMILY.

The Sharps of Horton and Woodhouse—Connexion between the families attempted by Granville Sharp, the philanthropist—The line of James Sharp, of Woodhouse, traced—Thomas Sharp, drysalter, Bradford—His son, John Sharp—His elevation to be Archbishop of York and Metropolitan of England—Archbishop Sharp's death in 1713—His family—Thomas Sharp, Archdeacon of Northumberland—John Sharp, Prebendary of Durham and Archdeacon of Northumberland—Granville Sharp, the celebrated philanthropist and friend of the slave—Pedigree of the Archbishop's family	260—278
---	---------

Contents.

xi.

CHAPTER XI.

	PAGE
THE CLARKSON FAMILY	281—293

CHAPTER XII.

THE STANSFELD FAMILY	295—307
----------------------------	---------

CHAPTER XIII.

THE ROOKES FAMILY	308—311
-------------------------	---------

CHAPTER XIV.

DR. NETTLETON	312—317
---------------------	---------

CHAPTER XV.

GREENWICH OBSERVATORY	318—328
-----------------------------	---------

INDEXES.

ERRATA AND ADDENDUM.

- On page 30, read—"Bradford, July, 1701," not "1791."
On page 64, in foot note—"N. lat. 53°," not "33°,"
On page 76, in second foot note, read—"The cost being defrayed by
Halley himself."
On page 127, read—"Van Ceulen" for "Van Culen."
On page 175—"Henry Briggs was a Fellow of St. John's College,
Cambridge," not "*Oxford*."
-

It may be well to add that the *fac-simile* letters of Halley, on page 33, and of Flamsteed, on page 129, have been reduced from the original MS. about one-third. Sharp's letters have been reproduced exactly as they appear in the originals.

PREFACE.

The publication of a "Life of Abraham Sharp" has been the desire of the Author for many years. Sharp's life-long labours in the twin sciences of mathematics and astronomy; the important part he played in bringing the latter to a practical test by means of his inventive and mechanical genius; and the somewhat ambiguous nature of the account which had been given of his personal history, all seemed to call for such an account as would do justice to his genius and his works. Beyond detached notices of him, however, many of which are clearly traceable to a common origin, no Life of Sharp had been written, although nearly 150 years have elapsed since his decease, nor has justice been done to his ability and industry either by contemporary writers or by modern scientists. Fortunately, materials affording ample testimony of his title to rank even with contemporaries like Sir Isaac Newton, Dr. Halley, and Flamsteed, the first Astronomer-Royal, have come into the Author's hands, and the result appears in the present work.

As will be apparent from a perusal of the volume, the

subject has been treated historically rather than mathematically. The unfortunate controversy in which the Rev. John Flamsteed, Sir Isaac Newton, and Dr. Halley were engaged in connection with the publication of the *Historia Cœlestis* formed a theme which is exhaustively treated in the correspondence upon which this work is largely based, but the letters of Flamsteed and Sharp also abound with problems in mathematics which, if they were given, would need much more space than could be afforded in a work of this nature, even if it were profitable to do so after this lapse of time. On the other hand, it seemed desirable that the *personnel* of the Yorkshire mathematician and astronomer and his surroundings should be brought into prominence, and this has been done with the result among other things of discrediting some errors which had obtained credence regarding him, besides investing the work with a local interest which it would not otherwise have possessed.

The Author cannot too warmly express his gratitude to many gentlemen, who, either by their counsel or their aid in other ways, have assisted in the compilation of this work. The initiation of its publication almost savoured of accident. Mr. E. W. Haines, of Parsons Green, London, having seen a copy of a work recently published by the Author, in which extensive reference was made to the Sharp family of Horton, and in which Abraham Sharp was eulogistically alluded to, at once communicated the fact that he was in possession of many of the family deeds and a mass of correspondence between Sharp and his contemporaries. With great generosity

Mr. Haines offered the use of this valuable material to the Author, and this offer being gladly accepted, it was subsequently supplemented by other documentary evidences of a like character from Major Haines, of Westminster. To both these gentlemen, therefore, the Author gratefully tenders his acknowledgments and thanks for the favours received.

To Edward Hailstone, Esq., F.S.A., he is indebted for many important MSS. and Sharp evidences, and for much valuable information on the subject possessed by no other person. Francis Sharp Powell, Esq., M.P., has been equally generous in his assistance, which was rendered more acceptable by the personal interest that gentleman has taken in the production of the work.

Of a character equally acceptable has been the assistance received by the Author from scientific gentlemen standing high in their respective spheres. W. H. M. Christie, Esq., the Astronomer-Royal, gave a courteous assent to the Author's request to be permitted to copy various MSS. in the archives of Greenwich Observatory; and the Council of the Royal Society, Burlington House, also granted the privilege of making use of the Society's valuable library; as did also the Council of the Royal Astronomical Society. To Dr. J. W. L. Glaisher, F.R.S., Trinity College, Cambridge, ex-President of the Royal Astronomical Society, and the Rev. Robert Harley, F.R.S., of Oxford, the Author is also indebted for generous appreciation and assistance.

The Author also tenders his acknowledgments and thanks for services rendered by Mr. Alex. R. Binnie, M. Inst. C.E.,

President of the Bradford Philosophical Society ; Mr. T. T. Empsall, President of the Bradford Historical Society ; Mr. John Lister, M.A., of Shibden Hall ; Mr. T. Waldron, B.A., Thornton Grammar School ; Mr. Matthew Clarkson, New York, U.S.A. ; and Mr. John Stansfeld, Leeds. To Mr. John Thornton, Bradford, who supplied the heraldic drawings ; and to Mr. W. G. Hird, of Bradford, for the careful indices accompanying the work, the Author is especially indebted. The page illustrations are by the London Autotype Company ; the zinco engravings by Messrs. W. Byles & Sons, Bradford.

BRADFORD, *January, 1889.*

CHAPTER I.

Some account of the Sharp family—Pedigree of the family—Abraham Sharp's early days—His apprenticeship—Goes to London—Appointed assistant to Flamsteed, first Astronomer-Royal—His career at Greenwich Observatory—Sharp fits up the Mural Arc—Description of its construction—Assists Flamsteed in making astronomical observations—Sharp's removal from Greenwich to Portsmouth—His return to Horton.

The town of Bradford, in Yorkshire, noted as the metropolis of the worsted industry, can boast of but few of her sons who have made their mark in history ; neither has it been the abode of many old families of gentility. Almost wholly engrossed with the pursuits of trade, the more wealthy of the inhabitants have been content to be accounted substantial yeomen, obtaining their riches conjointly by the making of cloth and the farming of land. In this atmosphere, and with these surroundings, Abraham Sharp was born at Little Horton, a township of Bradford, on June 1, 1653. He belonged to a family which has been settled at Horton for five hundred years, and is still represented. So early as the year 1365, as appears from a deed executed at that period, William de Leventhorpe, the then lord of the manor, conveyed to Thomas Sharp two bovates or oxgangs of land and a messuage in Little Horton, adjoining to lands belonging to the Abbot of Kirkstall. Further testimony that the Sharps were among the earliest yeomen who held land acquired from the lords of the manor is furnished in an ancient deed in the possession of Edward Hailstone, Esq., F.S.A., of

Walton Hall, Wakefield, temp. Richard II., a *fac simile* impression of which is given. Briefly summarised, this deed is to the following effect:—

Know present and future that I, William, son of William, son of Ivo of Bradford, being of full age, have given, granted, &c., to William Hawmondrode, junior, and Thomas, son of John Sharpe, of Littelhorton, half an acre of land with its appurtenances, &c., lying in the Souter-halfacres in the Field of Littelhorton, To have and to hold, &c., by services thereto due, &c.

Witnesses—William of Lewenthorp, Geoffry of Lewenthorp, William of Tyersall, William Hawmondrode, sen., John Sharpe, and John of Newall of Littelhorton, &c.

Given at Littelhorton on the fourth day of July, 1391, and of the reign of Richard the Second the fifteenth.

Besides the name of Sharp, that of Hammond (or Hawmond) is the only one mentioned in the deed which survives in the township.

The Sharp pedigree supplies considerable information as to the antiquity of the family, and also as to its standing. From this source we learn that the progenitor of the family, whose descent can be clearly traced, was Christopher Sharp, the elder, of Horton, born probably some time before 1480. He was assessed at Horton, with four others, 2nd June, 1523, as possessing £20 in goods, on which he paid 20s., the largest amount in the place. At the assessment of the subsidy granted 34th Henry VIII. (1542), there were still only four persons assessed, each paying the sum of 10s. upon £20 worth of goods. The will of Christopher Sharp, in which he directs to be buried in the Church of God and St. Peter, at Bradford, was dated 1st February, 1541; and proved 4th March, 1543.

John Sharp (whose wife was named Isabel), of Horton, only son of his father Christopher, and his executor, was, like his father, assessed in 1545 on £20 value in goods, for which he paid 13s. 4d., being the only assessment to that amount excepting that upon Humphrey Wood, who paid the same.

In a further account of the same subsidy, made 1st May, 1548, he paid 26s. 8d. upon the said £20 worth of goods; and again in that made 5th Edward VI. (1551), under the subsidy granted 2nd and 3rd Edward VI., he was assessed as possessing £16 in goods, for which he paid 16s., the largest sum excepting that charged upon Thomas Wood, who paid the same.

The will of John Sharp, in which he directs his body to be buried at the Church of St. Peter, at Bradford, is dated 11th February, 1557; proved 27th April, 1558. After the usual introduction, the testator proceeds:—

*“Item—*I bequeathe to my sonne Thomas 3 waynes, 2 plowes, 1 harrowe with yoks, tearnes, and other geare to them belonginge for husbandrye, as hath been accustomed to be kepte heare at this my howse in Horton before-sayde. And also of everie kynde of vessel which ys att the seyd howse and ther hath ben accustomed to be occupied, one thyng of the beste.” To his son John he bequeathed 20s. in money. To his “dowter” Margaret, wife of Thomas Swan (Swaine), 20s. To John, “sonne of my sonne John,” 3s. 4d. To Sir Richard Hogeson, “preste,” 20s. All the remainder of his estate he bequeathed to his wife Isabel, to Christopher his son, and to his three daughters, Elizabeth, Isabel, and Alys, whom he names as his executors.

Thomas Sharp, called the elder, of Little Horton, yeoman or clothier, eldest son of John Sharp, and to whom his father in 1557 left “one thing of the best of every kind of vessel accustomed to be occupied at his house at Horton,” was one of four persons assessed 18th February, 1568, under a subsidy granted 8th Elizabeth, as having 20s. in lands, the highest rating in Horton, and was again assessed for the same 15th September, 1572, under a subsidy granted the year preceding, when it was still the largest amount. In the assessment of the subsidy granted 39th Elizabeth (1597) he was called senior, and assessed for lands of the value of 30s., an increase of more than thirty per cent. to his wealth, which may be accounted for as follows:—

By indenture dated 4th October, 1589, Thomas Sharp, with

three others, viz., Thomas Hodgson, Robert Booth, and William Field, had conveyed to them by Richard Lacy, lord of the manor, and John, his son, all the unenclosed wastes of the Manor of Horton, namely, 250 acres, and 14 acres lately enclosed. By another indenture, dated 2nd June, 1595, Thomas Sharp purchased from Thomas Hodgson, for £88, Bowling Mill Close, in the tenure of William Law; and in conjunction with his younger son, John, he purchased in 1601, from Thomas Wood, other closes called the Leysteads, the North Croft, &c., with divers rent charges, to wit, 30s. and a boon hen out of lands at Haycliffe, besides other lands. By another indenture, dated 1st June, 1604, he was joint purchaser of the Hollingreave lands.

The will of Thomas Sharp, in which he directs to be buried in the church or churchyard at Bradford, was dated 23rd April, 1607, and proved 16th July following. After the usual introduction it proceeds:—

“Nowe my will is to dispose of my goods and chattels as follows. First, Elizabeth, my wife, shall have one-third part of all my goods. The other third to Mary my daughter for her child’s portion, the other third as follows. After funeralls, mortuaries, and other debts are paid, to Thomas Sharpe my eldest son 3 waynes and cowpes with wheels and furniture, four yockes of oxen, 4 iron tearnes, 3 plowes, 1 arrow with iron teeth, also my corslett and pike with all the furniture belonging, and also 2 oxen.” He then gives to Thomas and John Sharpe, children of the aforesaid Thomas, his son, “2 branded steares”; to Mary his daughter £40 over and besides her third, and to Isaac Sharpe his son £5 for the residue of his child’s portion. He gives to Mary, daughter of the aforesaid Thomas, his son, “1 black quy and calfe.” “And if the said third part of my goods and the said £40 given to Mary my daughter will not extend and amount to the sum of £200 the same shall be made up to the full sum of £200 out of the residue of my third part and given to Mary and the remainder be divided equally between Elizth., my wife, and Thos., Isaac, and John, my sons, and Mary, my daughter,” and he appoints Elizabeth, his wife, his executrix.

Witnesses, Christpr. Swaine, Abm. Swaine, John Wood, and John Sharpe.*

* The name of Sharp is rendered in various ways in ancient manuscripts, but we have adopted the modern form throughout the context.

The Sharp family consisted of two branches, both of which sprang from Thomas Sharp, whose will has just been quoted. His eldest son, Thomas Sharp, of Little Horton, married Margaret Walker. He had a brother John, each being assessed upon 20s. value in lands, showing that the family property had been doubled since 1572. John, the younger son, became a distinguished Royalist, and fought in several battles on the side of Charles I. This is the only branch now represented at Horton, namely, by Francis Sharp Powell, Esq., M.P. for Wigan, and to it we shall subsequently refer. Tracing the line to which Abraham Sharp belonged, we find that his ancestors were staunch Parliamentarians and Puritans. The Sharps appear to have been yeomen and clothiers from an early period. In the West Riding Sessions Rolls, under date 12th January, 1598, Samuel and Robert Sharp (described as late of Horton, but then of Tong, where there was a strong branch of the family) are also described as clothiers, and John Sharp as a tanner.

The will of Thomas Sharp, the eldest son of Thomas Sharp, the elder, is dated 16th August, 1636, and was proved 5th April, 1637. In it he bequeaths—

To Thomas and John, his grandsons, 5s. each. To Mary Molson and her sister, grandchildren, 5s. each ; to nephew Wm. Wilkinson and Mary Waterhouse, 5s. each. To all his servants and grandchildren, 1s. each ; to Sarah and Elizabeth, his daughter, 200 marks each out of his goods and chattels ; but if said goods do not realise so much, his son John his heirs were to make good these bequests within two years after his decease or after the marriage of said daughters. He appoints Margaret his then wife and her two daughters to be joint executors.

Witnesses—David Clarkson and William Wilkinson.

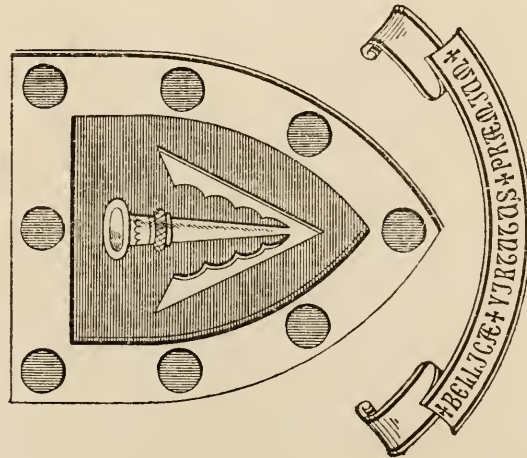
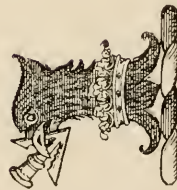
The above Thomas Sharp had a family of seven children, of whom one of the daughters married the Rev. John Nalson, of Walkington, near Beverley, and Elizabeth married the Rev. William Clarkson, Vicar of Adel. John, the eldest son, born in 1604, was a yeoman and master clothier, but had attainments

Pedigree of the Sharp Family, of Horton.

ARMS: Azure, a pheon argent, charged with eight torteauxes.

CREST: An eagle's head crased, azure, ducally gorged, holding in its mouth a pheon argent.

MOTTO: *Ballice Virtutis Premium.*



CHRISTOPHER SHARP, of Horton, born some time before 1480, died in 1543, possessed of considerable property. Had a brother (or near relative) James, witness to his will in 1541, presumed to be the father of James Sharp, of Woodhouse, N. Bierley, grandfather of Archbishop Sharp. Left an only son =

JOHN SHARP, = ISABEL,

his executor, who on his father's death was assessed in £20 in goods, and from whom sprang the Sharps of Tong. Like his father, was buried at the Church of St. Peter, Bradford. Will dated 9th February, 1557; proved April 27th, 1558.

THOMAS SHARP, = ELIZABETH,

called the elder, yeoman and clothier, of Little Horton, to whom his father, in 1557, left "one thing of the best of every kind of vessel accustomed to be occupied at his house at Horton." Purchased of the Ladies in 1589, with three others, 250 acres of the moors and wastes of Horton. Buried at Bradford Church. Will dated 23rd April, 1607; proved 16th July following. Settled on his younger son, John, a portion of his estates.

THOMAS SHARP, junior, = MARGARET.

son and heir, of Little Horton, yeoman, witness in 1607 to the will of his uncle, Christopher. Released to his brother John his interest in a portion of his estate. Buried at Bradford Church. Will dated 16th August, 1636; proved 5th April, 1637.

ISAAC

yeoman, of Little Horton, a distinguished Royalist, who never suffered his beard to be shaven after the execution of Charles I. Married in 1606. By various indentures his father settled on him a portion of his estates, to which he added by purchase from his elder brother Thomas. Buried at Bradford, 2nd June, 1658.

JOHN SHARP, = SUSAN,

only daughter, married to Michael Waterhouse, of Shelf, gentleman.

CHRISTOPHER SHARP,

of Little Horton.

Will proved May, 1608.

JOHN SHARP,

of Tong.

Will proved 1613.

fitting him for higher walks in life. Inspired by the political sentiments of Hampden and Pym, he sided with the Parliamentary cause during the disastrous Civil War period, and became the confidential friend and financial secretary of General Fairfax, the Commander of the Forces. He was also a skilled accountant, a shrewd man of business, and, withal, imbued with high religious principles. His career calls for more ample reference than can be given at this stage, and, like that of his uncle, the Royalist, will be treated of subsequently. John Sharp was the father of ten children, of whom Thomas Sharp, M.A., Vicar of Adel, and Abraham Sharp, the mathematician and astronomer, were distinguished sons. Another son, John, is described as a citizen of London; Isaac was a tradesman; Samuel, entered at Clare Hall, Cambridge, died in his seventeenth year; and there were other two sons, named William and Robert, besides daughters.

John Sharp, the Parliamentarian, left to his eldest son, the Rev. Thomas Sharp, M.A., his house and lands at Horton, with portions to his younger children; and upon the site of the ancient mansion Thomas Sharp erected in 1675 Horton Hall, or properly speaking, he encased the old timber-built house which had served his progenitors as a residence in an outer shell of stonework, using up much of the old material, as is shown by a plan in the possession of Mr. F. S. Powell, M.P. A sketch of Horton Hall, as it was left by the builder, is given in a subsequent portion of this volume. The frontispiece shows it as it now stands, a modern erection having taken the place of one of the old wings.

The Rev. Thomas Sharp married, first, Elizabeth Bagnall, who died in childbirth in 1670; secondly, Faith, a daughter of the Rev. James Sale, of Pudsey. The issue of his second marriage was a son and two daughters. The son, John Sharp, M.D., grew to be a man of great promise. Having studied medicine at Leyden, he returned to Horton, but died in 1704, at thirty years of age. Dr. John Sharp's sister, Elizabeth,

married in 1703 Robert Stansfield, drysalter, of Bradford, whose son, Robert, by a second marriage, purchased the Esholt Hall estates of the Blacketts. The only child of Robert Stansfield by his first wife was a daughter, Faith, who married Richard Gilpin Sawrey, and carried the Horton estates to him, but there being no issue of the marriage, this branch of the Sharp family ended at her death in 1767. By her will, dated November 16th, 1767, Mrs. Sawrey bequeathed to Hannah Gilpin, the only daughter of William Gilpin, Esq., of Whitehaven, all her estates, in the following terms, viz. :—

“I give and devise unto Miss Hannah Gilpin (now living with me), daughter of William Gilpin, formerly of Whitehaven in the co. of Cumberland, sugar boiler, my late husband's cousin, and to her heirs—All that my capital messuage or mansion house in Little Horton, wherein I do now dwell, &c., and all and singular my lands situate and being in Bradford, Great Horton, and Burley Woodhead and elsewhere, and all other my lands, tenements, and real estate of whatever kind or nature soever, to the use of the said Hannah Gilpin and her heirs for ever,” conditional upon her making Horton Hall her usual place of abode, and upon the decease of the testator taking the surname of Sharp; the same condition to apply to any person she might marry.

Hannah Gilpin married in 1769 Charles Swain Booth, only son of the Rev. Charles Booth, of Bradford, and both took the name of Sharp. In default of issue of this union, too, the estates of this branch of the Sharps passed in succession to Ann Gilpin, who became Mrs. Ann Kitchen, and married for her second husband Mr. Edmund Giles. Subsequently the estates devolved on Mrs. Haines, of London, a daughter of Mrs. Giles by her first husband. The subjoined pedigree will supply many more details than are here given, but for the present the above must suffice, with the addition of the fact that John Sharp, Archbishop of York and Primate of England, 1691 to 1713, born at Bradford, was also related to the family.

When Abraham Sharp was born, England was passing through a critical period of its existence. It was during the

Commonwealth, and Oliver Cromwell was practically King of England. The town of Bradford, near to which the Sharp family had dwelt for generations, had in the Civil Wars sustained two sieges, and its defenders had been worsted by the Royalist forces, from the effects of which the inhabitants suffered long afterwards. The town was at that period engaged in the making of woollen cloths, an occupation which Abraham's father, John Sharp, added to that of husbandry—a not unfrequent combination in the north of England at that and subsequent periods. From the sequel it will appear that neither of these occupations were congenial to Abraham Sharp, nor, indeed, did they offer attraction to other members of the family, to the exclusion of more intellectual pursuits.

Of Abraham Sharp's boyhood we have no further record than that he was first sent to school in his native village, Horton, and was afterwards transferred to the Grammar School at Bradford. This school enjoyed, about that period, a considerable reputation for the excellence of its curriculum. Among the most celebrated of its pupils were John Sharp, Archbishop of York, a relative of Abraham Sharp; and Dr. Richardson, F.R.S., of Bierley Hall, the intimate friend and correspondent of Sir Hans Sloane and other eminent naturalists and savants. Here Abraham Sharp acquired the rudiments of his education, and here also he developed a love of mathematics, to study which he must have become a good Latin scholar, as all the mathematical text-books of the school were in Latin. A knowledge of this fact indicates his industry in the acquisition of knowledge even as a boy. At the age of sixteen he was apprenticed to a mercer, named William Shaw, of the city of York. A copy of his indenture is appended:—

Abraham Sharp's Indenture of Apprenticeship.

This indenterre made the fower and twentieth day of May in the one and twentieth yeare of the Reigne of our Sovereigne Lord Charles the Second by the Grace of God of England, Scotland, France, and Ireland, King,

Defender of the Faith, Between WILLM SHAW, of the Citie of York, Mercer, on the one part, and ABRAHAM SHARPE, sonne of John Sharpe, of Little Horton in the Countie of York, Clothier, on the other part—Witnesseth that the said ABRAHAM SHARPE hath put and bound himself apprentice unto the said WILLM SHAW and after the manner of an apprentice with him to dwell from the making hereof unto the full end and term of eight years from thence next ensuing fully to be compleet and ended, during all which said time the said ABRAHAM SHARPE the apprentice him the said WILLM SHAW as his master well and truly shall serve, his secrets shall keep, his commandments lawful and honest everywhere shall doe, fornication in the house of his said master nor without he shall not committ, hurt unto his said master he shall not doe, nor consent to be done, but to his power shall it not, and forthwith give his said master warning thereof; taverns of custome he shall not haunt, unless it be about his said master's business there to be doing; at cards, dice, or any other unlawful games he shall not play, the goods of his said master inordinately he shall not waste, nor them to any other person send without his said master's license, nor shall trade for himself or any other person except for his said master in any kind of merchandise neither beyond the seas nor at home during the said terme without his said master's license; matrimony with any woman he shall not contract, nor any marry or take to wife within the said terme without his said master's license; from his said master's service he shall not absent himself either by day or night, but shall behave himself as a true and faithful servant ought to doe as well in words as in deeds, yielding to his said master a just and true account so often as he shall be required during the said terme, and in which said terme the said WILLM SHAW, the master, him the said ABRAHAM SHARPE, his apprentice, in the trade or misterie of a Mercer which he now useth, and shall teach and inform or cause to be taught and informed, and in due manner shall chastise him, finding to his said apprentice meat, drink, and cloth linen and all other things necessary for such apprentice after the custome of the Citie of York; and shall give yearly to his said apprentice during the said term six pence in the name of his stipend or salary.

In witness whereof the parties named in these present indentures interchangeably have set their hands and seals the day and yeare first above written, Anno Domini, 1669.

It would appear from an entry in the memorandum book of the Rev. Thomas Sharp, Abraham's elder brother, that a sum of £20 was paid as a premium towards Abraham's apprenticeship. The embryo mathematician and astronomer, however, did not take kindly to the yardstick and counter; his taste for the abstruse sciences unfitted him for dealing in dimity and calicoes, and he soon left his York master, who was probably glad to be

rid of such an uncongenial assistant. Not so kindly did John Sharp, the father, take to his son's defection, he having evidently designed him for a commercial life somewhat in sympathy with that which he in part followed. It would further appear that, left to his own resources, Abraham Sharp determined not to return to his paternal home, but proceeded to Liverpool, where he opened a day school and taught writing and accounts, the while studying navigation and making progress in the science of mathematics. It was while at Liverpool that young Sharp first heard of Mr. Flamsteed, the astronomer. Tradition has it that Flamsteed was at the time residing in the house of a merchant in London, with whom Sharp became acquainted while he was on a visit to Liverpool, and that in order to be brought into contact with one so gifted in astronomical research, Sharp engaged himself as bookkeeper to the merchant, and so got to London. Unfortunately, the memoranda of Abraham Sharp's referring to the interval between his leaving York and reaching the metropolis throw little light on the subject, and in the absence thereof, tradition may be permitted to go unchallenged. The incident is certainly in keeping with what is known of the earlier and later career of Abraham Sharp, indicating as it does the unswerving persistency with which he sought to add to his knowledge of the abstruse science of mathematics.

Sharp's desire to become acquainted with Flamsteed can be explained upon another ground. It is very unlikely that he had the benefit of any teacher of the science after he left the Bradford Grammar School, and it is not probable that even there he would receive anything beyond the rudiments of such knowledge. The neighbourhood of Halifax, seven miles distant, had given to the scientific world, in the person of Henry Briggs, the first Savilian Professor of Geometry at Oxford, who materially improved upon the then newly-propounded system of logarithms. But Briggs had passed away before Sharp was born. The neighbourhood had produced no equal in the art of calculating until Abraham Sharp appeared upon

the scene, and it is somewhat notable that, among other studies, he took up Briggs's subject, and did much in perfecting that branch of mathematics. Even in his maturer years Sharp lamented the absence of any scientific neighbour with whom he might hold converse. Of Abraham Sharp, therefore, it might be emphatically said that he was a self-taught man, and admiration for the great abilities he subsequently developed will not be diminished on that account. As may have been already observed, he came of a proverbially talented family, and it is none the less certain that he himself was possessed of great natural abilities.

Considerable doubt has existed among previous writers on the subject of Abraham Sharp's introduction to the society of Flamsteed, and as to the date of his removal to London. Happily he had been trained in a methodical school, and from the time of his reaching London he kept account of every halfpenny he expended, in pocket memorandum books suitable for the purpose. Several of these interesting relics are in the possession of Mr. Hailstone, and of F. S. Powell, Esq., of Horton Old Hall, who have placed them at our service in the compilation of this work. The entries are made in Sharp's beautifully-formed characters, but so minute that a powerful magnifying glass has been found indispensable in copying such items as were of interest. The entries extend from the year 1684 to 1734, eight years before his death. From this invaluable source of information we shall cull extensively, as the material contained therein affords an insight into the life and character of the man, which, taken in conjunction with the letters written by him, is not otherwise attainable.

In a letter dated Greenwich, September 20th, 1710, and addressed to Abraham Sharp at Little Horton, Flamsteed wrote: "You lived with me in 1684 and 1685," going on to narrate certain astronomical observations taken at the time. At that date Sharp would be thirty-one years of age. Sharp's earliest

memorandum book confirms Flamsteed's statement. Under date March, 1684, we find the entry—

Boat hire to Greenwich... £0 2 0

followed by other items during that and the following two years showing payments made on behalf of Mr. Flamsteed. Under date May, 1687, there are the entries—

Recd of Mr. Flamsteed... 15 0 0
Recd of my brother* 5 0 0

Under date April, 1688—

Recd more of my brother and cozent†... ... 10 7 6

From these entries we gather that Sharp was in the employment of Flamsteed from March, 1684-5, to April, 1688, but at a stipend not sufficient to maintain him in a position suitable to his occupation. The reason of this will appear in the narrative referring to Flamsteed's appointment as Astronomer-Royal, the niggardly allowance made him by the Government for his services not admitting of his properly recompensing an assistant. Not only this, but the only instruments which the Astronomer-Royal possessed were an iron sextant of seven feet radius and two clocks given to him by Sir Jonas Moor, together with a quadrant of three feet radius and two telescopes which he had brought with him from Derby. His father dying in 1688, Flamsteed succeeded to the family property, and at once determined upon the construction of a mural arc, much stronger than a former one he had had made, but which had proved a failure. The instrument here alluded to is the celebrated mural arc made and divided by Abraham Sharp, with which Flamsteed subsequently made all those observations from which the "British Catalogue" is deduced.

Flamsteed's version of the construction of this famous

* The Rev. Thomas Sharp, M.A. † Robert Clarkson, mercer, of London.

instrument is given in the *Prolegomena* in the third volume of his *Historia Cœlestis*, in which he says—

In May, 1688, J. Stafford, my amanuensis, died, and in the following August I employed in his place Abraham Sharp,* a man much experienced in mechanics, and equally skilled in mathematics. He strengthened the rim of the limb with screws, carved the degrees upon it, affixed an index, and made all and each of its parts so skilfully that it was a source of admiration to every experienced workman who beheld it.

Turning to Abraham Sharp's memorandum books we again find corroborative testimony as to certain details of the construction of this famous instrument. Thus, under date August 18th, 1688, we find the items—

Pd ye men tht brt up the instrument ...	...	£0	0	4
Pd Roger Bates for the platform and or.				
things for ye quadrant ...	...	0	11	6
Spent on ye men that carried the quadrant up				
to Greenwich ...	...	0	0	6
Pd for bringing ye deals from ye yard ...	...	0	0	4
Laid out for Mr. Flamsteed for lignum vitæ...		0	6	0

The mural arc was finished in September, 1689, and from that date every observation made by Flamsteed assumed a tangible and permanent form, his previous observations having been dependent upon subsequent correction. It was from this period, indeed, that Greenwich Observatory really dated its completion.

A description of this celebrated instrument, the mural arc (of which a sketch is given), is appended. The original in Latin will be found in Flamsteed's work already referred to :—

And now we come to a description of the Mural Arc. The making of this [instrument] was principally the work of Abraham Sharp, my most

* In a note to the article "Flamsteed and Greenwich Observatory," published in the *Gentleman's Magazine* of February, 1866, the exquisite workmanship of Abraham Sharp in connection with the mural arc is alluded to, and it is added—"Abraham Sharp was the first artist who cut divisions upon astronomical instruments with any pretensions to accuracy, and the first on the list of those skilful men whose mechanical talents have been of such material aid to the astronomers of Greenwich."

trusty assistant, a man enriched with gifts and resources of every kind to render him competent to complete a work so intricate and difficult. This instrument cost me fourteen months' work and over £120 in money. I will here give some account of it, and will afterwards show how my Catalogue of Fixed Stars was obtained from observations carried on by me through nearly thirty years, by means of this instrument after it had been completed.

The radius from the centre of the arc to the edge of the spiral is $79\frac{1}{2}$ inches, and along the rods or radii is supported by iron bands above and below, of which the upper band C L and the middle one C R are thicker, and the others more slender. At right angles with the middle band C R is another iron band E K, and on the lower side, under E, where they are joined together, is placed a large iron nail which is driven into a firm piece of oak which is fixed to the wall, and so strengthens the arc, and the other ribs joining to and supporting it at the points marked *d d*. Another heavy iron rib, *r l*, parallel to this is placed on the fulcrum, which is connected with the three middle radii in the points *c c c*, which, together with the lower face of the limb, near the points *i* and *r*, and where the 2nd and 4th radii pass through the greatest iron band, namely, at the points *d* and *d*, two other supporting beams *d b* and *d b* are raised as far as the two extreme radii at *b* and *b*, and as far as the upper transverse beam. All the radii *e r*, C R, *c r*, *r r*, are fixed to the upper solid beam *i m*, under the centre C, at *o o o o*, and the whole instrument hangs from and is sustained by two thick iron supports under the upper beam at N and N, above the wall.

To the meridian wall (to which it is affixed) various pieces of wood are fixed which keep the arc removed from it, and by means of iron and of wooden wedges, keep the arc stable and always at the same distance from the wall, so that it is unable to swerve unless the wall subsides or bends from the perpendicular.

The index of the arc is formed like that of a sextant, but is much heavier, and for the relief of the hand which raises or depresses it, is fastened to a cord, which, by means of a screw and of a balance-weight, removes a great part of the weight, and renders it easy to be moved by a careful man. This index is fitted with telescopes of convex glasses, and with a pair of cross threads like the index of a sextant, and is carried round the limb by means of a screw attached to it, which is carried round in the same manner as the index itself and needs no further description.

Now in order to find where the starting point of the divisions was to be placed on the arc, after I had fitted a perpendicular of very thin brass to a suitable place on the index, so that it might move freely above the indicating plate, I turned the cell supporting the crossed threads so that a fixed star passing the meridian might be indicated by the filament. Then, having lowered the index towards the zenith, on the 15th, 16th, and 17th July, 1689, I observed the bright star in the head of Draco across the meridian, or transversely (by means of) the defining filaments, before

indeed, the index was turned about above the instrument whose plane is directed to the eastern part of the heavens. At the same time, Mr. Sharp, my associate at that time, who had made the various parts of this instrument, had marked a point on the surface of the index, above which the perpendicular (or plumb line) oscillates with the help of a good telescopic convex lens.

The next night the index was removed to the opposite meridian wall which looks towards the west, where the centre and arc were adapted for receiving it, and the index and the perpendicular having been fitted as before above the arc, the transit of the same bright star in the head of Draco was observed; and during the same time Mr. Sharp made a point on the arc above the index, over which the perpendicular was oscillating; and these points, along with the intervening point, having been fixed by repeated experiments, the index was again placed above the arc, and moved by screws until the slender perpendicular fell in the middle between the two points defined by the previous observations, when it was placed above the western plane of the wall and the plane of the instrument. The index having been thus placed, a transverse line was drawn through the limb for the beginning of the smallest divisions, not only with respect to degrees and minutes, but even revolutions of the screw which bites the toothed edge of the limb, and which causes the index to revolve through all its parts, and the revolutions of the screw and the degrees are at the same time numbered by this line in the limb of each.

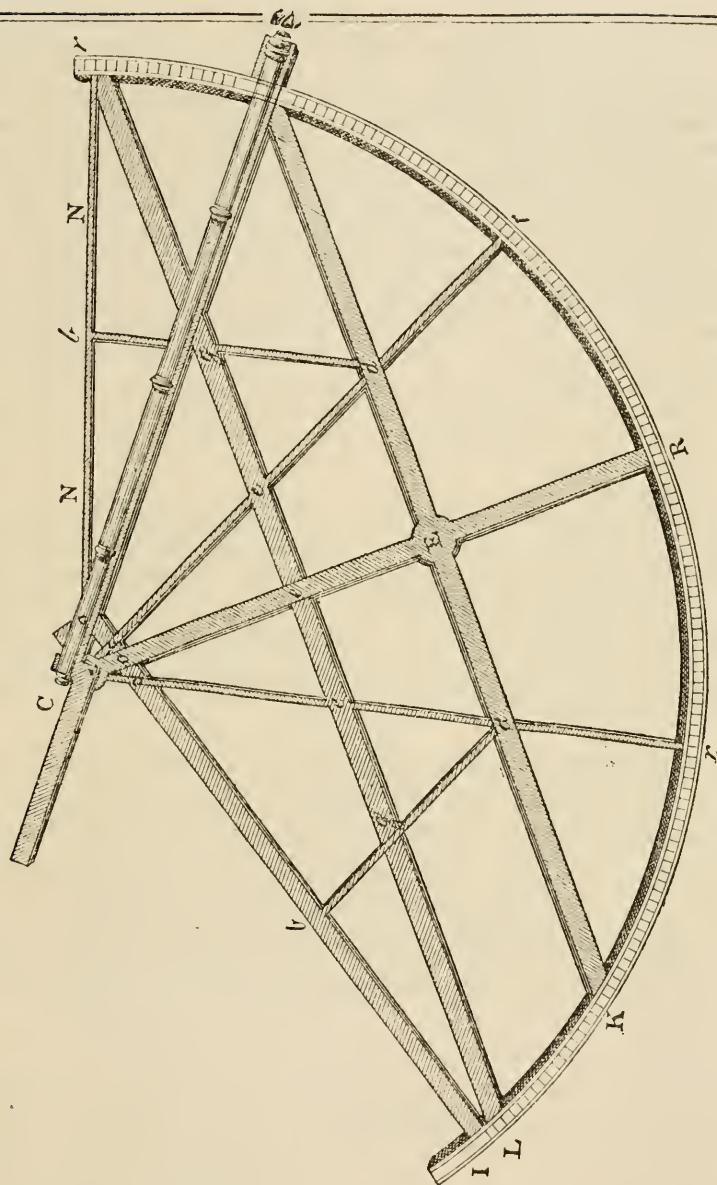
There is a passage in the Prolegomena in which Flamsteed alludes to an *error of division*, which is without explanation. Fortunately there are in the Flamsteed MSS. letters which throw considerable light on the subject. Joseph Crosthwait, Flamsteed's assistant, alludes to it in a letter dated January 27th, 1721-2. Abraham Sharp's reply, dated February 2nd, 1721-2, is given in Baily's "Life of Flamsteed," the following being a portion of it:—

HORTON, *February 2, 1721-22.*

SIR,

I return you my thanks for your kind and generous account of my assistance, which you may be assured shall ever be acknowledged in anything within the compass of my ability. But I can give you little or no satisfaction about Mr. Pound's scruple about an error Mr. Flamsteed makes allowance for in the division of the mural arc. I can assure you there was not the least mention of any such thing during my abode with Mr. Flamsteed, which was more than a year after it was finished. In which time almost all the stars, except those constellations near the North Pole, were observed satisfactorily; indeed, whenever Mr. Flamsteed gave

ARCUS MERIDIONALIS



Copied from a Drawing in the "Historia Caestis."

me the least help thereto in any of his labours. This I know, that all the care that could possibly be was taken in setting off the fundamental division, viz., 60° equal to the radius. Wherein I had not only Mr. Flamsteed's advice and inspection, but assistance, which was absolutely necessary, being a matter of very great consequence and difficulty, since the instrument was fixed against the wall in a perpendicular position; therefore requiring the hands of two persons to apply the beam compass with an extent of near seven feet thereto. Considering which, 'tis not strange that, notwithstanding all the care that could be used, so small an error might be committed, since a wooden beam of so great length might easily and imperceptibly yield as much if not more than it amounts to, especially in the perpendicular. But you know there was not the least suspicion of any such thing entertained then, nor during my residence there, that I had the least notice of; nor did Mr. Flamsteed mention anything of it about three years after, when I returned from Portsmouth, and observed, together with his servants, at times by the mural arc most of the circumpolar stars, which you will find in his waste red book, about February or March, 1693-4.

When I was with him before, about 1690 or 1691, I remember I observed the two bright stars in the Dove, or Colomba, though I do not find them among his printed observations. I presume Mr. Flamsteed judged they were not to be depended upon, because of the great refraction, they not appearing to the naked eye, but found out by the telescope, in the midst of the thick atmosphere, seeming but a degree above the horizon. Would gladly know whether you have ever met with or seen these observations; they might be of some use to me in comparing with Dr. Halley his place of those two stars.

Commenting upon this letter of Sharp's, Mr. Baily wrote:—"It would appear that the supposed error was detected by Flamsteed, but on a revision of his computation it was found that the discordance arose almost wholly from the errors in the table used by Flamsteed, and that when Bradley's refractions were adopted those discordances nearly vanished, so that there was no just ground for supposing that the arc was erroneously divided."

After the construction of the mural arc, Abraham Sharp continued some time at Greenwich Observatory assisting Flamsteed in making observations on the meridional zenith distances of the fixed stars, the sun, the moon, and planets, with the times of the transits over the meridian; as likewise the distances of the sun and moon, and their eclipses, with those of

Jupiter's satellites, the variation of the compass, &c. He also assisted Flamsteed in making his catalogue of near three thousand fixed stars, as to their longitudes and magnitudes, their right ascensions, and polar distances.

The following items, taken from the memorandum book already alluded to, are illustrative of Abraham Sharp's receipts and payments during the time that he remained in Mr. Flamsteed's service, viz. :—

February, 1689, to April, 1690.

Hat and band	...	...	...	...	£	0	10	0
Rd of Mr. Flamsteed	...	...	...	...	10	7	6	
Cravat	...	...	...	...	0	2	6	
Pair of purple hair shag breeches	...	...	...	...	0	15	0	
Bible and case	...	...	...	...	0	4	6	
Dutch quills	...	...	...	...	0	1	0	
Pounce	...	...	...	...	0	0	4	
Peruke	...	...	...	...	0	4	0	
Two pair of gloves	...	...	...	...	0	2	10	
Dinner at coffee house	...	...	...	...	0	1	0	
Religion and Reason adjusted	2/6,	barber	1/0	...	0	3	6	
A serge frock	...	...	...	...	0	16	0	
6 pair gloves, water carrge to London	6d.	...	...	...	0	6	6	
A razor 3/-, case 6d., penknife gridg	4d.	...	...	...	0	3	10	
Conic sections	...	...	...	...	0	1	0	
A screw plate and 13 taps	...	...	...	...	0	7	4	
Letter 4d., spent at coffee house	6d.	...	...	...	0	0	10	
Wateridge to and from London	...	...	...	...	0	0	5	
Spent at the White Horse	...	...	...	...	0	0	6	
Two pair of stocks and taps	...	...	...	...	2	10	0	
A sword belt and false scabbard	...	...	...	...	0	10	0	
Pair of boots 10/-, whip 2/6	...	...	...	...	0	12	6	
Hat and band	...	...	...	...	0	10	0	
Rd of Mr. Flamsteed	...	...	...	...	6	10	0	

Nov. 4, 1690.

Removed from Greenwich to Mr. Court's.*								
Conveying my goods down	...	...	...	...	0	1	2	
Spent with Mr. Raphson	...	...	...	...	0	0	7½	
Pd to Mr. Court for rent of rooms	...	...	...	...	3	10	0	
Pd for half-year's dyett at 4/- per week	...	...	...	...	5	0	0	

* Letters addressed to Abraham Sharp at this time bore the superscription :—" For Mr. Abraham Sharp, at Mr. Court's, at the Mariner and Anchor, on Little Tower Hill, London."

There is little if anything in the correspondence carried on between Flamsteed and Sharp, or in the memorandum books of the latter, to indicate the reasons which led to Sharp's leaving Greenwich. It has been said that his health gave way under the continuous night watchings at the Observatory. From his correspondence we gather that he was not indifferent to climatic influences, and coming from a northern part of the kingdom, it is not improbable that he found the climate of the south somewhat enervating. Writing to his brother, the Rev. Thomas Sharp, under date January 17th, 1690-1, he says:—"I have an invitation to a clerk's place in the King's shipyard in Portsmouth which I believe might be beneficial, but the place I am informed is so unhealthful and so far distant from all friends I have little encouragement to accept it."

The following letter was soon afterwards also addressed to the Rev. Thomas Sharp, "to be left with Mr. Thomas Wilson, merchant, Leeds," his brother at that time being minister of Mill Hill Chapel, Leeds, although residing at Horton:—

LOVING BROTHER,

I received yours, but before yt I had the £10 of Cos. Robert, for which I gave him a receipt. I am not as he hasty and hungry after money. I had much rather it should remain in your hands than you should put yourself to ye least inconvenience in returning it. I bless God I have not wanted since I came hither.

I think I gave you some account of an offer made me of a pretty advantageous place at Portsmouth, which I durst not accept of upon good reason, especially it being a place so notorious for ye unhealthiness of ye air. I have had since another offer of the same place I formerly lived in here in London upon more advantageous terms, which I believe I shall be obliged to accept, since I find during these warre times not such encouragement in my present business as I expected, and might reasonably hope at another season. I shall give you a further account ere long how it is determined. I fear I shall have no convenience to make use of the vice you offered to send. I have more tools and other things here already than I can use. I have all ye iron and brasse work for two engines, for turning all kinds of rose and oval work, screws, &c., which Cosen John had, and understood would find him diversion enough, since, as you write, he has a mechanical genius as well as other of his

relations, which in my judgment is not to be disapproved nor wholly discouraged, though you design him for a trade, since it may be a means to prevent more vicious courses. That wood I sent formerly (which is now scarce and dear) was designed to be wrought in these or such engines. When that may be I know not. I direct still to Leeds, though you seem to intimate you seldom come there. If it may be more convenient to send to Horton, please in your next to give notice to

Your very loving Brother,

A. SHARP.

TOWER HILL, LONDON,
March 21, 1690-1.

In February, 1691, Abraham Sharp appears to have removed to Portsmouth, as the following items in his memorandum book indicate :—

Feb., 1691.

Pd for coach to Portsmouth	£0 9 0
Lodging and dyett to July, 1691	37 11 10
Brought to Portsmouth July, 1693 clear	49 0 0 .
Rd of Mr. Graham half year's salary... ..	5 0 0

Mr. Graham was probably a shipwright, and employed Sharp in making nautical instruments. He also added to his means by making mathematical and astronomical instruments, and in teaching navigation, there being several entries such as "Rd 4/6 per week for teaching" in his account books. His receipts for the year 1691 were £96 12s. 6d. While at Portsmouth he also held some position in the King's shipyard, as under date April 15th, 1693, occurs the entry—

Rcd the King's gratuity of Comr. Tymewell... £19 13 6

This amount he distributed among 665 shipwrights, caulkers, joiners, sailmakers, &c., a sum of 19s. 6d. excepted, disposed of as follows :—

Pd this 19/6 to Wm Griffin per Comr.'s orders to buy drink and make bonfire for the King's coming home.

From the entries in Sharp's memorandum books we are enabled to trace the writer of them until his return to his

home at Horton. Thus the following items have evident reference to his leaving Portsmouth:—

Came to London, Feb. 1st, 1693, and lodged yt night at the White Horse, Cripplegate. Had 7 boxes and 2 trunks.

9 nights' lodging at the White Horse, 3/-, fire, 6d., Sunday dinner, 10d., chamber maid 1/-, 5s. 4d.

Sent to Bradford per John Hall six trunks, weighs forty stone.

Left in Coz. Robt. Clarkson's hands, £29 10 0.

He put into lottery for me, £20.

Next occurs the entry—

Came to Little Horton, March 29, 1694.

CHAPTER II.

Abraham Sharp at Horton—His correspondence with Parsons, Speidell, and Halley—The mathematical chair at Christ's Hospital—Death of John Sharp, M.D.—Abraham Sharp succeeds to the family estates—Continues his mechanical operations and mathematical studies—Notice of Flamsteed, the first Astronomer Royal—His appointment to take charge of Greenwich Observatory—His controversy with Sir Isaac Newton—His contributions towards the elucidation of Newton's theory of the law of gravitation—Rupture between Flamsteed and Newton—Preparation of the *Historia Cœlestis*—Difficulties in the way of the publication charged upon Sir Isaac Newton and Dr. Halley.

We have now to deal with the career of Abraham Sharp after his return to his ancestral home at Horton, which he never afterwards left, except for some brief holiday, until his death in 1742—a period of nearly half a century. For about twenty years after Sharp returned to Horton, a correspondence was kept up by him with his late employer, Flamsteed, from which copious extracts will be made in a subsequent chapter. For the present it will be convenient to take note only of such communications as were addressed to Mr. Sharp by several of his correspondents in the Metropolis, although there are many letters extant addressed to him on mathematical subjects from students in various parts of the provinces.

The following letters, written about the time of his return to Yorkshire, afford some indication of the high position Abraham Sharp had attained as a mathematician in the estimation of his metropolitan contemporaries, and also of

their desire not to lose his services, by securing for him a responsible position in London:—

LONDON, 9th February, 1694-5.

SIR,

I received your letter, which was so welcome to me that I am unable to express my grateful sense of the very kind encouragement you have given me in that part of it which relates to my book, and as for the other part, it is easier for you to imagine than for me to give you an account how joyfully I received it, and when I showed it to Mr. Speidell, he was so transported therewith, that he could not rest until he had communicated it to Mr. Halley, who was extremely well pleased therewith, and desired me to present his service to you, and to acquaint you that he was very glad that what he had done in the Transactions I sent you fell into the hands of a person who understood and knew how to improve it, and is very desirous to see what you have done therein, and told me he thought it would be very convenient to put it into a Transaction.

You have put us all into such a longing condition that we shall be almost impatient until we receive it, and therefore beg the favour of you to send it with all convenient speed, in a letter to me, enclosed in one for Mr. Speidell, at the Custom House, which will save the charge of postage. The honour and kindness you have done me by your correspondence is more than I can sufficiently acknowledge, and though I know not how I shall ever be able to requite it, yet shall it always (to the utmost of my power) be endeavoured by

Your most obliged and humble servant,

JOHN PARSONS.

LONDON, March 7th, 1694-5.

SIR,

This day Mr. Colson, Mr. Halley, Mr. Parsons, and myself have been together, where, among other discourses, it was said Mr. Pagett, Mathematical Master at the [Christ's] Hospital, hath resigned. Mr. Parsons and I thought fit to acquaint you with it, and that if you have a mind to seek after it, Mr. Halley and Mr. Colson say that if you write to Mr. Flamsteed about it, whereby he will approve of you, it will go a great way with the Governors, and Mr. Halley and Mr. Colson will also do their utmost to make interest for you. When this comes to your hand, and if you have a mind to appear in the matter, they say you must be speedy in writing to Mr. Flamsteed, that so there may not be an election before you come, which they think may be not till after Easter, and therefore, per next post, let me hear from you. Your last to me and Mr. Parsons we have, and have communicated the enclosure to all above, nay, to Mr. Raphson also, who said he would, in his reprinting of his book, take occasion to mention it if you

think fitting. Mr. Halley saith he will write this night to you; Mr. Parsons, present at the writing hereof, saith he will also write to you forthwith. With my humble service to you, and thanks for all kindnesses, I remain

Your obliged friend and servant,

EUCLID SPEIDELL.

Addressed—

“For Mr. ABRAHAM SHARP, at Little Horton. Leave this with Mr. Samuel Stansfield, in Bradford, in Yorkshire. To be conveyed with speed. These.”

LONDON, *March 9th, 1694-5.*

MR. SHARP,

I have seen your curious improvement of the method I published in the *Transactions* of May last, where you have apply'd Mr. Newton's invention of the uncia affix to the members of very high powers, to so good purpose that I cannot believe it can be carried further, and I congratulate you on your happy discovery. But since in your letter you mention the making the logarithms by this means, give me leave to observe to you, what perhaps you had overlookt, that if instead of 140737488355328 for the index of your power, you use 10000, &c., taken as infinite, and extract by this method the root-bearing unity, the remainder will be Napier's, or the hyperbolick logarithm for that number whose root you extracted. And if you extract the root of the power whose index is assumed 23025851, &c., which is Napier's logarithm of 10, that root unity shall be Briggs his logarithm of the number whose root you extract, wherein you will observe that the only difference between this and the method you lay down will be, that instead of c, d, f, g , &c., you may use $c, \frac{1}{2}c, \frac{1}{3}c, \frac{1}{4}c$, &c.; and if c be unity with ciphers, then $1 + e + \frac{1}{2}ee + \frac{1}{6}eee + \frac{1}{24}eeee + \frac{1}{120}eeeee + \frac{1}{720}e^6$, being put equal to any number, e shall be Napier's logarithm thereof, which I find results to the same with what Mercator has with the help of Gregory's improvements done in the Quadrature of the Hyperbola and the construction of the logarithms, as you will easily perceive.

I thought it fit to pay my respects to a person so worthily deserving of the mathematical studies, and if you have any thoughts of Christ's Hospital, it is ere long to be disposed of, and you may in my opinion stand as fair for it as you are deserving it, if it deserve you. In such case you may be sure of all the assistance I can give you, though you will not need it, if Mr. F. [Flamsteed] be willing to befriend you. I shall be glad to hear from you when you can find leasure, and you may direct to me, to be left with Mr. Hunt, in Gresham Colledge.

I am, your very loving friend and servant,

EDMUND HALLEY.

Addressed—“For Mr. ABRAHAM SHARP, at Mr. Stansfield's, Bradford.”

Mr. Sharp did not interest himself in the appointment at Christ's Hospital, to obtain which his friends were willing to assist him, and which he would in all probability have stood a good chance of obtaining had he wished it. There was a cogent reason why he preferred to remain at Horton, and one, too, which probably influenced him in leaving the South and returning home. In the autumn of 1693 his elder brother, the Rev. Thomas Sharp, had died, leaving a widow and a son, the latter a young man—heir to the paternal estate—who was studying for the medical profession. Under these circumstances the management of the family property fell to Abraham Sharp. He therefore returned to Horton Hall and resided with his sister-in-law, paying her for his board, a practice which he continued for many years afterwards. The following is one of many receipts before us:—

June 24th, 1701.

Received of my brother, Abraham Sharp, the sum of £40, being in full payment of all such debt as is owing or may be demanded by me for his dyett and lodging during his abode in my family since his first coming to the twenty-fifth day of March last,—By me,

FAITH SHARP.

Witness—ELIZABETH SHARP.

Shortly after Abraham Sharp had taken up his residence at Horton, his nephew John proceeded to study physic at Leyden. Towards the close of the seventeenth century the University of Leyden enjoyed the highest reputation as a school of medicine, and thither resorted most of the youth of Europe destined for the highest department of the healing art. Dr. Richard Richardson, of Bierley Hall, studied physic there, and it was probably the intimacy of the doctor with Abraham Sharp, the uncle of John Sharp, which led to the latter also being sent there to receive his medical tuition.*

* Dr. Richardson, F.R.S., was a near neighbour of Abraham Sharp, and although their tastes were not in perfect accord, they communicated with each other in after life. Dr. Richardson's residence was at Bierley Hall, near Bradford, which is still in excellent preservation. At this place he

Dr. Sharp made good use of his natural abilities during his residence at Leyden, and returned to Horton with every prospect of adding reputation to the name he bore. Possessed of an ample inheritance, and in daily intercourse with one so well advanced in the sciences as his uncle Abraham, his lot appeared to be cast in pleasant places, but not long after his return to Horton he died at the premature age of thirty years. The management of the funeral obsequies devolved on Abraham Sharp, as appears by the memorandum books of the latter, which show the following among other expenses to have been incurred, viz.:—

Funeral Expenses on Dr. Sharp's Decease, 1704.

Given ye Poor of Little Horton, 12d. each ...	2	2	0
To Thomas Rowland—for Clerk, 1s. ; Grave Maker, 1s. ; Dog Whipper, 1s. ; Clerk and Vicar for burying in quire, 6s. 8d. ; to Mr. Rawson, 10s.	0	19	8
Paid for coffin, 26s. ; tolling bell, 18d. ...	1	7	6
Will Baldwin—for cloth for mourning for sister and cousin Robert Stansfield and wife, crape for fifteen hatbands, and gloves...	26	16	0
John Topham—for a suit of mourning and other things	5	13	0
Will Mortimer—8¼ galls. of ale	0	8	3
Will Holdsworth—4 qts. Canary at 2s. 10d., 4 qts. claret at 19d.... ..	0	17	8

was born September 6, 1663, and was educated at Bradford Grammar School, afterwards studying physic at Leyden. He was elected a Fellow of the Royal Society in 1712. Dr. Richardson was a great botanist and antiquarian, and corresponded with Sir Hans Sloane, Dillenius, Uvedale, Lhwyd, Consul Sherard, Dr. James Sherard, Marmaduke Fothergill, Tom Hearne, Ralph Thoresby, and many others eminent in natural philosophy. Writing on the subject, his biographer says: "That Dr. Richardson has not hitherto received the praise he may be supposed to have deserved, is to be ascribed to the simple fact that mankind in general act very much upon the principle of a bill of exchange, in which the concluding words, 'value received,' form an essential ingredient." Dr. Richardson gave to the world little or nothing in a published form, and has been denied the credit which his undoubted knowledge and high scholastic attainments entitled him to. Four papers in the *Philosophical Transactions* form the sum total of Dr. Richardson's printed works. If he published little under his own name, however, he was a valued contributor of knowledge to others—to Sir Hans Sloane and Dillenius, for instance; and he was a ready supporter pecuniarily in regard to many botanical publications. Dr. Richardson, however, was not only a botanist. On the contrary, he had given considerable attention to the other departments of natural history, and his studies appear to have embraced the general range of polite literature. He died at Bierley Hall, in September, 1741, one year before the death of Abraham Sharp.

John Carter—20 qts. claret at 19½d., 2 qts.			
Canary, 10 galls. of ale at 10d.	2	8	6
Thomas Walker — cloth and furniture for mourning for A. S.... ..	5	4	4
Gloves for funeral	5	14	10
A peck of apples 11s. 6d., crop of beef 7s. 4d.		0	18 10
Total charges of ye funeral ...	£72	9	0

By the death of his nephew, the family estates fell to Abraham Sharp, but, notwithstanding, he felt the loss of his nephew keenly, and gave expression to his grief in the following letter to Flamsteed:—

Letter from Abraham Sharp to J. Flamsteed.

HORTON, *January 22nd, 1704.*

SIR,

My delay in returning answer to your two so exceedingly obliging letters had been absolutely unpardonable had not a merciful Providence pleaded my excuse, which has so disturbed and perplexed me somewhat that it is with much trouble and discomposure that I now write. It has pleased God to take out of this world my nearest kinsman and only nephew, a young man ever hopeful, in the flower of his age, who had a few years ago been a student of physic at Leyden. A good proficient for his time, just beginning to practise, of good parts and solid judgments. The only son of a most disconsolate mother, him on whom the hopes of a family depended which has continued here in the name above 500 years—now likely to be extinct—the only person here with whom I could have any agreeable converse. Under these circumstances I think it not fit to trouble you, nor care to enhance my loss and aggravate my grief, so much extraordinary care and business is hereby devolved upon me. Besides, my engagements will at present scarce admit of any leisure, so that I fear I shall not be able to give you any tolerable account of my observations of the satellites' eclipses this year, being for a season, I doubt, deprived both of opportunity and convenience, for which I am the more concerned and dissatisfied since I fear lest it should be more disappointment to you, who were pleased to express your desire of depending upon me for it, though I can never judge my observations worthy your confiding in them, having no one to assist me, therefore am necessitated to manage the telescope myself, and could not be any worth by being oft disturbed by shifting the tube; even at the very instant I find it hard to attain to the exactness of the half minute.

I shall not be negligent whenever a fit opportunity offers, but it is very little of this nature that can be expected in my present circumstances.

However, if the printing of your observations proceed, of which I have had an encouraging account very near hand, I shall be infinitely desirous to yield you all the assistance I am capable of in calculation or whatever else you think fit to entrust me with, and though for the present I shall have little vacancy, yet after some time I hope to be more at liberty to serve you.

I could heartily have wished my strength would have permitted me to comply with your notion of coming to Greenwich, but my present business links me so inseparable to Horton that I can yet see little probability of leaving it. Yet if a turn of affairs which seems not far from a crisis do happen, there may be a prospect of greater liberty, of which you shall have timely notice of from,

Sir, your most obliged and humble servant,

ABRAHAM SHARP.

On the death of his nephew the ties of home were so strengthened that no inducement could prevail upon Mr. Sharp to leave it during the remaining forty years of his life. How multifarious were the duties which fell to him may best be conceived by a perusal of his memorandum books, which are crowded with entries relating to payments on account of the family estates and kindred matters. Along with these duties he combined mathematical and astronomical studies, which must have absorbed a great portion of his time, communicating the result of his researches to his contemporaries, which involved a correspondence of a most voluminous character. A part of his time, too, was taken up in constructing astronomical and mathematical instruments, especially telescopes, the glasses and tubes being ground and turned with his own hand ; and he also made many of the implements by which such instruments were constructed. This is evident from the numerous items in his diary referring to cranks, lathes, and other mechanical appliances. Thus, in his account of expenditure during 1694, the same year that he returned to Horton, we find items like these :—

Pd Will Webster, for ironwork for a rest	...	£	0	10	0
A crank for my wheel, and other things	...	o	2	6	
Thomas Rowland, wood for a lathe	...	o	3	6	
Ironwork for pedestal for telescope	...	o	5	6	

Hoop, staples, and screws, for rest	0	1	3
Gallon rape oyle	0	2	6
Two sheets for lenses	0	2	0
Two looking-glasses	0	6	6
Steel for screws, iron for rivets... ..	0	1	11
Hand saw and gouge	0	3	11

The following entries show that Mr. Sharp's mechanical labours were not entirely unremunerative, although we gather from the names of his clients that his handiwork only found its way into select circles. The items occur between the years 1698 and 1708 :—

Rd of Sir John Armitage for dyall	£2	2	0
Rd of Mr. Wainhouse for a measuring wheel, for the Archbishop*	5	7	6
Rd of Mr. Walker for dyall	1	0	0
Rd of Sir John Armitage for telescope	3	10	0
Rd of Mr. Rawson for drawing of his dyall	0	15	0
Rd from Sir John Middleton for ye wheel	6	9	0
Rd of Sir John Armitage for cane and equinoctial dyall	2	15	0

The following unique letter from Mr. Yarwell is quoted to show that Mr. Sharp drove a hard bargain for such material as he required in his workshop, and was also difficult to deal with in regard to the conditions which he exacted for good workmanship. The Mr. Yarwell referred to was a glass grinder

* The following letter, found among Sharp's MSS. has an evident connection with the item here referred to :—

For Mr. A. Sharp, at Little Horton.

BRADFORD, July 30th, 1791.

SIR,—I desire you will let me know whether or no that instrument you promised to make for my Lord Archbishop be ready, because I have received a second letter wherein he desires to have it with all convenient speed. Our services wait upon your family, and believe me to be your very faithful friend and humble servant,

NATHANIEL WAINHOUSE.

P.S.—If it be made in an uncommon method pray send what directions you think convenient along with it.

[Mr. Wainhouse was afternoon lecturer at the Bradford Parish Church in 1700. In 1695 he married Mrs. Jane Richardson, the daughter of Lawyer Richardson, and niece of Archbishop Sharp. He was appointed Vicar of Silkstone by Archbishop Sharp, being succeeded in that living by the Rev. John Clarkson, who married another niece of the Archbishop's.]

in London, and supplied the Horton astronomer during many years with particular glasses for telescopes and other objects. The letter is given *verbatim et literatim*:—

LONDON, April, 1705.

MR. SHARP,

I have your letter of January 26. I am glad you omit the large convex glass, for I always lost by them. For the other sort I have. I need not tell you agane that thick glass wt vanes is hard to gett, and I must tell you that the way of working all our convex glasses now is quite another way than formerly, for now the new way of making them is by working 4, 6, or 8 together, and our tubes is now fitted for this way, so that you may know that your sending for soe many several depths gives me not only a grate deal of trouble, and the rest are not soe fit for my purpose. You may be sure I should be glad to please both you and all men, but I must confess *I have had more complaint from you than from all the rest of mankind*, with the least profit, for the last you had, which I worked hard upon for the very journeyman wages, cost me thirty shill. Soe you may see I shall get noe estate by them, and yet if your friend had not persuaded me much to give you this letter I beleave I should have been silent, soe much I prefer the pleasing my friends before my own interest, for after all you can find no falt with the work of the glass but the glass itself, while you may be sure I should get as good as possible I can, tho' not soe good sometimes as I could wish.

I hope you will excuse this long letter, which I take noe grat pleasure in wrighting nor you in reading, but as you are my friend I would set the matter in a wright light, and leave the rest to your better judgment.

Your assured friend,

JOHN YARWELL.

P.S.—This is the longest letter I ever writ concerning my bisness, and I hope I shall never wright one soe long agane in all my life to come, which if it had not been to you I should never have writ, for very littel doe I love it.

J. Y.

Addressed—"For Mr. ABRAHAM SHARPE, att Littel Horton, near Bradford, Yorkshire.

These."

As a variation upon his mechanical occupations, Mr. Sharp had abundant employment for the exercise of his mental faculties in solving the problems submitted to him by numerous correspondents, not only in the Metropolis but throughout several counties of England. By such correspondents the Yorkshire astronomer was apparently held in the

highest esteem. Indeed, if need be, letters might be quoted showing that he was looked upon as a marvel of erudition in mathematical studies. Some of his correspondents were most lavish in their expressions of admiration of his abilities, and apparently grateful beyond measure for the readiness with which he gave himself to the solution of the various mathematical problems submitted to him. A specimen or two of his correspondence at this period only can be given, including a letter from Dr. Edmund Halley, one of whose epistles has been previously quoted. Dr. Halley's letter is given in *fac simile* on the opposite page. The next is from Jos. Raphson, the author of the "History of Fluxions," with whom Mr. Sharp had been on intimate terms during his sojourn at Greenwich:—

LONDON, 24th January, 1708.

DEAR SIR,

It is some years since I had the honour of a letter from you, and having been ever since taken up with business in a public office, I never had but little time to pursue any inclinations of my own. Among those friends with which it was a pleasure to correspond there was none greater than yourself, and, being at present disengaged from business, I should be very glad to renew it. I could not find Mr. Hodgson, though I sought him two or three times, and by whom I had designed to have sent you one of Dr. Cheyne's books, which I doubt not but you have seen long ere this, as alsoe the controversie between him and Mons. Moivre. I suppose you have also Sir Isaac Newton's Book of Light and Colours, and have perused his Treatise of Quadratures to the end of it. I shall be very glad of the honour of a letter from you, and to know if you have made any particular improvement that way. You may please to direct for me at Mr. James Downe's, at ye corner house, between Drake and Orange Street, near Red Lyon Square.

I am, your most obedient servant,

JOS. RAPHSON.

To Mr. ABRAHAM SHARP, at
Little Horton, Bradford, Yorkshire.

Raphson was elected a Fellow of the Royal Society in 1689. He died in 1715, while his work on Fluxions was in the Press.

London Aprill 23 1705

S^r I congratulate the success of your pains in the exact
 Quadrature of the Circle, which more than doubles the famous
 number of Van Coulen. I desired Mr Shorwin to thank you
 in my name for it, and to let you know that I should have been
 glad to have communicated a Method I have thought on for
 that purpose, than which I believe it is not in nature to do it
 more easily, and which might have saved you some Elbow.
 I know your Design. It is by taking the thirds of
 the π of 12 infinitely and then dividing by the odd numbers in
 arithmetical progression adding and subtracting the Quoties
 alternately. This I find, by a letter of yours I have seen, that
 Mr Shorwin has sent it you exemplified so that I need describe
 it no more. In the sum you ask the Demonstration thereof, which
 is very easy, and is founded on the same principles with Mr Leibnitz's
 famous series $\frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} &c =$ to the Area of the Quadrant,
 viz. that the fluxion of the Tangent of an arch is to the fluxion
 of the arch as the square of the Sine to the square of the radius
 which is thus evident. Let QAR be any arch and RT the
 Tangent. Drawing CA , TP will be the fluxion of the Tangent
 $= \dot{t}$ and Aa the Correspondent fluxion of the arch $= \dot{a}$. Now by
 similar triangles Tp is to Qp as CT to CR , and again Qp is to \dot{a}
 as CT to $CR = CA$ wherefore Tp is to \dot{a} as CT to CR , that is as
 $1 + tt : 1 - tt :: \dot{t} : \dot{a}$. Wherefore dividing both by $1 + tt$ the Quotient
 will be $\dot{t} - \frac{tt\dot{t}}{1+tt} + \frac{t^2\dot{t}}{1+tt} - \frac{t^3\dot{t}}{1+tt} + \frac{t^4\dot{t}}{1+tt} &c$ equal to the fluxion of the arch
 and its Integral or flowing quantity will be the arch it self, viz.
 $t - \frac{t^3}{3} + \frac{t^5}{5} - \frac{t^7}{7} + \frac{t^9}{9} &c$. Now the Tangent of 30° being $\sqrt{\frac{1}{3}}$ it is
 evident that $\frac{1}{2}\sqrt{\frac{1}{3}}$ is equal to the Cubo thereof, and $\frac{1}{2} \times \frac{1}{2}\sqrt{\frac{1}{3}}$ the
 fifth power thereof &c in infinitum. Whence is plain that the arch
 of 30° is $\sqrt{\frac{1}{3}} - \frac{1}{2}\sqrt{\frac{1}{3}} + \frac{1}{5}\sqrt{\frac{1}{3}} - \frac{1}{7}\sqrt{\frac{1}{3}} &c$ or $\sqrt{\frac{1}{3}} \times 1 - \frac{1}{2} + \frac{1}{5} - \frac{1}{7} &c$
 and six times this arch is the semicircumference of the circle whose
 radius is 1. that is $\sqrt{12} \times 1 - \frac{1}{2} + \frac{1}{5} - \frac{1}{7} &c$ which is our very Theorem.
 Mr Shorwin just now shows me your letter of the 20th instant.
 you have taken the pains to verify your former work by this method
 also for which I again thank you and wish it may at any time
 be in my power to testify the report I shall always have for a

I am very much obliged to you for your letter of the 20th instant.

I am very much obliged to you for your letter of the 20th instant.

Abraham Sharp's most voluminous correspondence, however, was with his former employer and colleague, Flamsteed, the Astronomer-Royal, of whose letters about 125 have been secured for the purposes of this work. This correspondence commenced soon after Sharp returned to Yorkshire, was continued until Flamsteed's death in 1719, and was carried forward by Joseph Crosthwait, his assistant at Greenwich Observatory, until the year 1730. It embraces a variety of subjects, but the principal, the most novel, and the most interesting is the account it gives of the repeated difficulties and impediments which delayed and almost prevented the printing of Flamsteed's great work, the *Historia Cælestis*, and the strange light which it throws on the history of that transaction.

These letters, with many others not now in existence, were deposited in an old lumber-room at Horton Hall, where Abraham Sharp was born and where he died. They were all addressed to Mr. Sharp, and sent through the General Post, whose mark they bear. The dirty appearance of many of the letters bears witness to the neglect they had suffered. Indeed, it has been stated that many of Sharp's manuscripts had been used for lighting fires, &c. The author of "Enemies to Books" bemoans the fate of a "Caxton" once used to light a library fire; and of rare manuscripts used up in papering trunks, &c. The historian of the Sharp family has equal reason to lament the demolition of documentary evidences of priceless value, the contents of which might have set at rest many points of great interest.

During the year 1832, however, Francis Baily, Esq., President of the Royal Astronomical Society, heard of the existence of a collection of Flamsteed's letters in the possession of Mrs. Giles, then owner of the Horton Hall estate, and he obtained permission to exhibit them at the meeting of the British Association, held at Cambridge in the year 1833. These letters afterwards formed the subject of a paper

prepared by Mr. Baily, and read before the members of the Royal Astronomical Society, and upon them, and other documents discovered at the Observatory at Greenwich, that gentleman founded his "Life of Flamsteed." With praiseworthy zeal and antiquarian instincts, Mr. Baily had the letters bound in a substantial volume, and also caused a copy of them to be made and bound up, which he presented to the Royal Astronomical Society, and which now forms part of the valuable library of that important institution. To both these sources we have had access in the compilation of this volume. Through the kindness and courtesy of Major Haines and Mr. E. W. Haines, of London, grandsons of the late Mrs. Giles, the original letters of Flamsteed to Abraham Sharp, and many other manuscripts belonging to the latter, were placed at our service; and with equal courtesy, Mr. W. H. Wesley, of the Royal Astronomical Society, allowed us to check several doubtful passages in the original MS. from the copy supplied to the Society by Baily. The correspondence formed one of the exhibits of the Rev. Robert Harley, F.R.S., at the annual conversazione of the Royal Society in June, 1887, and excited considerable attention.

In addition to the manuscripts secured by Mr. Baily (who was apparently only interested in the Flamsteed letters), there were many others left at Horton, subject to sad neglect and destruction. Fortunately they came into the possession of Mr. Edward Hailstone, F.S.A., on his taking up his residence at Horton Hall, and have been jealously guarded and preserved by that gentleman to this day. To Mr. Hailstone we are indebted for an inspection of these papers, which have yielded much valuable information.

As may be seen from the specimen given in *fac simile*, Abraham Sharp kept a copy of the replies which he forwarded to his correspondents, written in shorthand, upon the fly leaves or spare corners of the letters he received. Mr. Baily used every endeavour to get these shorthand notes deciphered, but

except in one or two instances without success. The system in vogue in Mr. Sharp's time (and which was then commonly acquired in order, it is said, the more readily to record the long-winded sermons of the period) is now obsolete. It was a system of stenography, and, as practised by Sharp, was further complicated by many abbreviations of his own. The characters, however, are beautifully formed, as might be expected from the nicety of all his caligraphy. In justice to Professor Baily's efforts, it is proper to state that we have been equally unsuccessful in deciphering Mr. Sharp's shorthand notes, and in consequence the purport of much that he wrote to his numerous correspondents is enshrouded in obscurity.

With regard to Sharp's correspondence with Flamsteed we have been more fortunate. It would appear that Professor Baily discovered that Sharp's answers in reply to Flamsteed's letters had been preserved by the latter in the Observatory at Greenwich, where they had lain unnoticed for over a century, and probably unknown to any but the custodians of the archives of that institution. Stranger still, that Mr. Baily made little use of the discovery in the account which he wrote of Flamsteed's life, and that he only gave three of Sharp's letters from those preserved at the Observatory. The pleasing duty of reproducing many of the remainder has been reserved to one of his own townsmen, and this duty the author cheerfully undertakes. Ere that were practicable, however, the permission of the authorities of Greenwich Observatory was necessary, and this was promptly and graciously given by W. H. M. Christie, Esq., F.R.S., the present Astronomer-Royal, who afforded the author every facility in referring to the manuscripts in his charge. Sharp's letters are carefully preserved in the archives of the Observatory, and by the methodical system of indexing in vogue at that institution are readily accessible. The correspondence extends from the first year of the eighteenth

century until the death of Flamsteed in 1719. The letters are written in Abraham Sharp's neat style of penmanship, specimens of which are given in *fac simile* in this volume, he having, as stated, preserved for his own reference a copy in shorthand upon the original letter. From the number of such shorthand notes attached to the letters he received from Flamsteed still existing, it is probable that some of the fullhand originals are missing.

To no historian is due the credit of having compiled anything like an adequate record of the life-long labours of Abraham Sharp, nor has justice been done to his many and valuable contributions to astronomical science by any of its professors. Professor Baily, however, was the means of placing in its true light the intimate relations which existed between Flamsteed and Sharp, and the valuable assistance rendered by the latter to the Astronomer-Royal. This Baily did by publishing in his "Life of Flamsteed" many of Flamsteed's letters, in which reference is repeatedly made to the genius of Sharp. It was evident, however, that Baily had principally in view the glorification of Flamsteed, and bringing to light certain facts relating to the preparation and ultimate publication of the results of his life-long labours in the *Historia Cælestis*. Hence the meagre reference made by him to the important part played by Abraham Sharp, his assistant and subsequent coadjutor in the publication of that great work.

It will, therefore, be the aim of the present author to establish Abraham Sharp's reputation as a mathematician and astronomer, and especially to accord to him due honour for the services he rendered in the preparation and publication of the *Historia Cælestis*.

In attempting this task, it is meet that full credit should be given to Mr. Baily for the great pains he bestowed on the object upon which he had set his heart, namely, to place before the public the facts relating to Flamsteed's career from the

time of his obtaining the appointment of Astronomer-Royal until his death ; also in making known the somewhat complicated circumstances attending the preparation of his hero's great work. It may be that, in accepting Flamsteed's version of the circumstances attending that publication, he laid himself open to the charge of accepting an *ex parte* view of the case, but of this the reader will have ample opportunity of judging in the correspondence to follow. The career of Flamsteed is so bound up with that of Abraham Sharp that we propose to draw largely upon the material prepared by Mr. Baily, as contained in his writings on the subject, and also from other authentic sources, before giving copious extracts from the original correspondence upon which these remarks are based.

The title of Baily's work is—"An Account of the Rev. J. Flamsteed, to which is added his British Catalogue of Stars, corrected and enlarged." It was printed by order of the Admiralty in 1835, for limited distribution only. To it was added a "supplement," published in 1837, with an equally limited circulation. The materials were principally compiled from a manuscript autobiography found among Flamsteed's papers after his decease, and the mass of correspondence in the possession of Mrs. Giles, at Horton Hall, to which reference has previously been made.

Flamsteed was a native of Derby, where he was born in 1646, and where he began his mathematical studies at a very early age. In the year 1667 he discovered the real causes of the equation of time, and wrote a tract on the subject, which was afterwards appended by Dr. Wallis to his edition of the works of Horrox, published in 1673. In 1669 he made a communication to the Royal Society, under an anagram, which also appears in the title-page of the tables appended to the Doctrine of the Sphere in Sir Jonas Moor's system of mathematics, in the preparation of which Flamsteed had a share. Flamsteed was on very intimate terms with Sir Jonas Moor,

who in 1674 proposed to build a private observatory at Chelsea, and to establish Flamsteed in it. In the meantime, however, the very serious errors found in the astronomical tables of the period impeded navigation by the difficulty of determining a ship's course at sea—in other words, of “finding the longitude”—by some more accurate process than that of the “dead reckoning” then in use.* A Frenchman, named St. Pierre, had propounded a scheme for finding the longitude, and the fact coming to the knowledge of the King, he appointed a Commission to inquire into its merits. Of this commission, Sir Christopher Wren, Surveyor-General, and Sir Jonas Moor, Master of the Ordnance, were members, and on the suggestion of the latter, Flamsteed was made a commissioner. Flamsteed quickly pointed out the impracticability of the Frenchman's proposals, and no more was heard of him or his scheme. This was really the origin of Greenwich Observatory. The King, alarmed at the evident lack of knowledge in regard to the motions of the moon and the stars' places, conferred with Sir Jonas Moor, and appointed Flamsteed “Astronomical Observer,” his mission being to “rectify the tables of the motions of the heavens and the places of the fixed stars, so as to find out the much-desired longitude of places, for the purpose of perfecting the art of navigation.” That was the Astronomer-Royal's commission, and for this important service he was to receive the munificent stipend of £100 per annum!

The question of a site for an Observatory remained, and Greenwich Hill was ultimately determined upon, on the recommendation of Sir Christopher Wren. The materials of the structure were second-hand, having formed part of an old tower and gatehouse which stood upon the site, together with a quantity of bricks stored at Tilbury Fort. During the course of erection Flamsteed was doing his best to fulfil his trust by taking observations at the Queen's House in Greenwich Park.

* See Norrie's “Navigation.”

The Observatory was opened in July, 1676. The Government of the day, however, had provided no instruments, so Flamsteed begged, borrowed, and made what he could to supply the deficiency; a micrometer and two clocks, given him by Sir Jonas Moor, standing him in good stead.

Cramped in his office as Astronomical Observator by the parsimony and indifference of his superiors, Flamsteed was further hampered by having to instruct two boys from Christ's Hospital in mathematics and navigation; and withal had to submit to a tax upon his paltry pittance amounting to £10 per annum, thus reducing his salary to £90 per annum! Eager to do something for astronomical science, however, he took other pupils, including lords, dukes, and captains of vessels, in order to augment his means, to be expended—without being returned, as it transpired—in the interests of his countrymen.

In the year 1675 Flamsteed took holy orders, having in the previous year obtained the degree of Master of Arts from Cambridge. In 1684 he was presented with a small living at Burstow, in Surrey, and his father dying shortly afterwards, he came into possession of some portion of the family property. The acquisition of these means not only enabled him to augment the astronomical apparatus at the Observatory, but inspired him with new zeal in his occupation. We have already seen how in 1689 he employed Abraham Sharp in constructing the mural arc, which he did at his own expense, in order that the observations taken at the Observatory might be worthy of the source whence they emanated. The following letter, addressed by Flamsteed to Sir Christopher Wren, Surveyor General to the Crown, affords ample indication of the pride which the Astronomer-Royal had in his work, and of the amicable relations which then existed between him and his superiors, albeit there had been no mitigation of the parsimonious conduct of the Government in furnishing the Observatory with proper astronomical apparatus, or with

sufficient assistance in taking observations and computing the results. The letter is dated

THE OBSERVATORY, *March 28th, 1700.*

HONOURED SIR,

My man has given you an account of the works I have in my hands, but I find he forgot what I chiefly gave him in charge, which was to add that I am now provided both of a competent number of places of the moon derived from observations taken with the mural arc, of Saturn and Jupiter, and also of necessary and convenient tables for examining any theory of those planets' motions that shall be brought, which you may please to take notice of whenever you fall into company where my labors are mentioned, if you think it convenient.

I am glad you are satisfied that what he acquainted you with concerning my want of help is no pretence, and am very much obliged to your kind offer of affording your assistance to procure supplies; but before that be attempted I am of opinion it would be very proper that some persons who understand well the nature, tendency, and use of my labors should inspect them.

The gentlemen of our society (however ingenious and well-wishers to all sorts of ingenious study) know very little of mine. There are none about town but yourself and the Master of the Mint [Mr., afterwards Sir Isaac Newton] that thoroughly understand how they conduce to the improvement of navigation, geography, and natural philosophy. You are both my friends, both zealous for the honor of the King and nation, and equally desirous that they should be published with all convenient expedition. My desires are altogether the same. I request the favor of you therefore to allow me to see you here some time immediately after Easter, and take a dinner with me in the Observatory without other company than yourselves, that I may shew you what I have by me ready for the Press and what I am preparing for it, and have your advice how to proceed.

I am going into Surrey for six or seven days; after my return I will endeavour to attend you in London, and if God spare me health I doubt not but with His blessing, and the assistance of yourself and the Master of the Mint (and that, too, such as will create you little or no trouble), the world may quickly see a large and useful produce of the labors of your most obliged and humble servant,

J. FLAMSTEED.

The public career of Flamsteed, from his appointment as Astronomer-Royal to the close of his life, resulted in his collecting that enormous mass of observations which furnished the first trustworthy catalogue of the fixed stars; in making those lunar observations on which Sir Isaac Newton depended

for the elucidation of his theory of the law of gravitation ; in his practical contributions towards the science of navigation ; and in his origination of the methods of observing, which were much in advance of those in vogue at the period. The great advances made in astronomical science have, of course, far outstepped the limits reached in Flamsteed's time, but with the practical assistance rendered him by his assistant, Abraham Sharp, his name will be deemed none the less illustrious on that account.

Were it not for the rupture which took place between him and Sir Isaac Newton and Dr. Halley, there would scarcely be found material in a life of such an unobtrusive character as that of Flamsteed upon which to found a popular account. Newton had been on very intimate terms with Flamsteed up to the year 1696, when a coolness arose, which is explained by Sir David Brewster in his "Life of Sir Isaac Newton." Whilst Newton was engaged on his lunar theory, he required observations of the moon's places, and visited Flamsteed in September, 1694, at Greenwich Observatory, who gave him 150 places and promised him more, on condition that he should show them to no one else, and should communicate the results in the first instance to Flamsteed only. Letters passed, Flamsteed communicating observations and Newton returning tables of refractions, tables of horizontal parallaxes, and equations for the apogee, but it would appear that Newton was not satisfied with what he obtained, and at one time gave up the lunar theory "as a thing impracticable."

The following letter from Sir Isaac Newton to Flamsteed, copied from the original in the library of Corpus Christi College, Oxford, was written at a period when the great philosopher's mind was seriously intent upon the lunar theory as helpful to the elucidation of the universal law of gravitation, propounded by him in the first edition of the *Principia*. He was then becoming impatient of the subject, and it is not difficult to detect in the tone of the epistle some amount

of acerbity at what he deemed Flamsteed's reticence in furnishing him with the information he required. The letter is as follows :—

CAMBRIDGE, *June 29th, 1695.*

SIR,

I received your solar tables and thank you for them, but these and almost all your communications will be useless to me unless you can propose some practicable way of supplying me with observations, for as your health and other business will not permit you to calculate the moon's places from your observations, it never was my intention to put you upon such a task, knowing that the tediousness of such a design will make me as weary with expectation as you with drudgery. I want not your calculations but your observations only. For besides myself and my servant, Sr Collins (whom I can employ for little money, which I value not) tells me that he can calculate an eclipse and work truly. I will, therefore, once more propose to you to send me your naked observations of the moon's right ascensions and meridional altitudes, and leave it to me to get her places calculated from them. If you like this proposal, then pray send me first your observations for the year 1692, and I will get them calculated and send you a copy of the calculated places. But if you like it not, then I desire you would propose some other practicable method of supplying me with observations, or else let me know plainly that I must be content to lose all the time and pains I have hitherto taken about the moon's theory.

I am glad you betake yourself to riding for your health rather than to physic. It is certainly the best and safest remedy for an ill habit of body, arising from bad blood in most cases, and therefore you may do well to continue it.

I am, your humble servant,

ISAAC NEWTON.

Newton undoubtedly desired Flamsteed's observations—the most reliable that could be obtained—as a confirmation of his great theory of Universal Gravitation, which, although put forth by the publication of the *Principia* in 1687, was not in England thoroughly accepted for years afterwards, and not for a generation after abroad. The earnestness with which he pleads with the Astronomer-Royal to overcome a reserve which was only too apparent on Flamsteed's part is observable in the following letter written by Newton :—

As for your observations, you know I cannot communicate them to anybody, and much less publish them without your consent. But if I

should perfect the moon's theory, and you should think fit to give me leave to publish your observations with it, you may rest assured that I should make a faithful and honourable acknowledgment of their author, with a just character of their exactness above any others yet extant. In the former edition of my book you may remember that you communicated some things to me, and I hope the acknowledgments I made of your communication were to your satisfaction, and you may be assured I shall not be less just to you in the future. For all the world knows that I make no observations myself, and therefore I must of necessity acknowledge the author; and if I do not make a handsome acknowledgment, they will reckon me an ungrateful clown. . . . And for my part, I am of opinion that for your observations to go abroad thus, with a theory which you ushered into the world, and which by their means has been made exact, would be much more to their advantage and your reputation, than to keep them private till you die, or publish them without such a theory to recommend them. For such theory will be a demonstration of their exactness, and make you readily acknowledged the most exact observer that has hitherto appeared in the world. But if you publish them without such a theory to recommend them, they will only be thrown into the heap of the observations of former astronomers, till somebody should arise that, by perfecting the theory of the moon, shall discover your observations to be exacter than the rest. But when that shall be, God knows! I fear not in your lifetime, if I should die before it is done. For I find this theory so very intricate, and the theory of gravity so necessary to it, that I am satisfied it will never be perfected but by somebody who understands the theory of gravity as well or better than I do.

In 1698, having resumed his investigations into the lunar irregularities, Newton again visited Flamsteed at Greenwich, who supplied him with corrections of former computations. Soon afterwards Dr. Wallis applied to Flamsteed for observations on the parallax of the earth's annual orbit, which he furnished, and at the same time mentioned that he had supplied Newton with materials "for the improvement of the Horroxian theory of the moon." This offended Newton, who wrote the following letter to Flamsteed, dated January 6th, 1698-9:—

Upon hearing that you had sent a letter to Dr. Wallis about the parallax of the fixed stars to be printed, and that you had mentioned me therein with respect to the theory of the moon, I was concerned to be publicly brought upon the stage about what, perhaps, will never be

fitted for the public, and thereby the world put into an expectation of what perhaps they are not likely to have. I do not love to be printed upon every occasion, much less to be dunned and teased by foreigners about mathematical things, or to be thought by our own people to be trifling away my time when I should be about the King's business.

Newton had just previously been appointed Master of the Mint. The breach between the latter and the Astronomer-Royal was, by the end of 1698, complete, and little communication ensued afterwards on this subject.

It is beyond question, from his many references to the subject, that Flamsteed did not accept Newton's theory of the law of gravity in the philosophic light in which the discoverer himself regarded it. As Dr. Whewell remarks:—"Like all the astronomers of his time, he (Flamsteed) understood by 'theory' only a mode of expressing laws of phenomena, not a new generalisation by which such laws are referred to a physical cause." That Flamsteed was conscientious in his beliefs, and jealous for the reputation of the office he held, there can be no question, but it has been urged that his physical temperament, and the frequent "distempers" to which he freely alludes in his letters to his correspondent, Abraham Sharp, occasionally soured his temper and somewhat warped his judgment.

Although the relations between Flamsteed and Newton on the subject of the lunar observations were somewhat strained, it would appear from the tone of the letter addressed by the Astronomer-Royal to Sir Christopher Wren, already referred to, in which he invites both Wren and Newton to dine with him at the Observatory, and inspect his work, that he harboured no ill-feelings. "You are both my friends," he wrote, and few will deny that at that period he, too, was disposed to be equally friendly. But this happy condition of affairs did not last very long. The difficulties encountered by Flamsteed in the discharge of his office, and the interference in his affairs which he experienced from

those whom he had regarded as his friends, aroused resentful feelings in his breast, which soon found expression in his correspondence with his colleague, Abraham Sharp. Another ground for the growing estrangement between Flamsteed and Sir Isaac Newton was undoubtedly the great friendship existing between the latter and Dr. Edmund Halley. Long before he openly broke with Newton, Flamsteed had conceived a dislike of Halley, which was manifest in all that he wrote.

During the long period that Greenwich Observatory had now been under Flamsteed's superintendence, the Government had not furnished it with a single instrument, a fact which should be here noted, in view of what is subsequently to follow. In addition to the fact that the whole of the instruments were Flamsteed's own property, the Government had not been at the expense even of repairing them, nor had they allowed him the cost of a single computer to reduce his observations, and the whole of this laborious work was performed at Flamsteed's own charge. During his long term of office as Astronomer-Royal, he had accumulated a vast mass of observations and other astronomical data, which he was repeatedly urged to publish, but declined until he was in a position to render available the deductions from them. This he was unable to do with the scanty aid he received from the Government in the way of assistants. His contemporaries, apparently ignorant of or indifferent to his hard position, were impatient at the delay, and urged immediate publication. Yielding to this pressure, Flamsteed drew up an estimate of the expense likely to be incurred in printing his works. Prince George of Denmark, the Queen's Consort, generously offered to bear the expense, and a committee, consisting of Sir Isaac Newton, then President of the Royal Society, Sir Christopher Wren, Dr. Arbuthnot, Dr. David Gregory, and Francis Roberts, were appointed to supervise the manuscript and direct the

printing. The official communication in which this intimation was conveyed to Flamsteed was as follows:—

GERMAIN STREET, *December 18th, 1704.*

MR. FLAMSTEED,

I received last night a letter from the Prince, wherein his Highness expresses that he is unwilling that your observations, designed for the benefit of navigation, and encouraged so well in the beginning, should want any necessary assistance to bring them to perfection, and therefore desires me, Mr. Roberts, Sir Christopher Wren, and some others of your friends to inspect your papers and consider what is fit for the Press, and when his Highness knows our opinion he is ready to do anything that may conduce to the making your observations of use to the public. This is the substance of the letter wrote by the Prince's secretary by his Highness's order. And to-morrow Mr. Roberts, Sir Christopher Wren, and the rest of the gentlemen to whom his Royal Highness has referred the inspection of your papers, are to dine with me, in order to consider of this matter and speak with you about it. And, therefore, I desire the favour of your company to dinner with them, and if you please to come in the morning and bring your papers with you, or such parts or specimens of them as may be sufficient, you will oblige me and the rest of your friends to whom the inspection of them is referred, and promote the despatch of this affair. If you bring the papers themselves you expedite your business, and you may rest assured that they shall not go out of your hands.

I am, your very loving friend and humble servant,

ISAAC NEWTON.

From this point Flamsteed's troubles may be said to have begun. In the first place, the Prince declined the publication of the maps, which Flamsteed considered the most important part, and such as would, in his opinion, tend most "to the glory of the work." Secondly, in the absence of any evidence beyond that advanced by Flamsteed, the committee to whom the superintendence of the business was entrusted appear to have thrown every possible obstacle in the way to prevent the progress of the printing as proposed by Flamsteed.

The terms upon which the *Historia Cælestis* were to be published, as suggested by Mr. Flamsteed to the Committee of Reference, were as follow:—

1. That the undertaker shall be who shall print the cheapest and on the best paper.



REV. JOHN FLAMSTEED.

2. That he shall renounce all right, title, and claim to the original copy, and to all the copy when printed.
3. That he shall not print, nor suffer to be printed, above 400 copies, or so many as shall be agreed upon, without the consent of the gentlemen intrusted and myself given under our hands.
4. That in order to prevent more than shall be stipulated and agreed upon, it shall be allowed to me, my agents or servants, to break the press as soon as the number agreed upon of any sheet or sheets shall be wrought off.
5. That the undertaker shall give good bond and security for the due performance of these covenants.

It was in 1704 that Prince George offered to defray the expenses of the printing ; but so many impediments were thrown in the way, that it was not till the end of the year 1707 that the first volume was completed. Before the second volume was commenced the Committee required Flamsteed to deposit in their hands the *original* MSS. of the "Observations," as well as such portion of the "Catalogue" as was finished. After much objection, the latter was *scaled up* in the presence of Sir Christopher Wren and delivered accordingly. New causes for delay, however, were brought forward, and before the second volume was ready for the press Prince George died.

During the whole of this time Flamsteed had only received from the Committee the sum of £125, which did not reimburse him for some recent expenses he had incurred in consequence of the interference of the Prince ; and, as he saw no prospect of any further support from the Government, he resolved to wait for more favourable times.

In April, 1711, Flamsteed wrote to Dr. Arbuthnot, the Queen's physician, a letter, of which the following is an extract, viz. :—

THE OBSERVATORY, *April 19th, 1711.*

SIR,

I have now spent thirty-five years in the composing and work of my Catalogue, which may in time be published for the use of Her Majesty's subjects and ingenious men all the world over. I have

E

endured long and painful distempers by my night watches and day labours. I have spent a large sum of money above my appointment out of my own estate to complete my Catalogue and finish my astronomical works under my hands.

Do not tease me with banter by telling me that these alterations [forty alterations and deviations from Flamsteed's copy in the first sheet, and as many more in the third sheet after the copy passed out of his hands] are made to please me, when you must be sensible that nothing can be more displeasing nor injurious than to be told so. Make my case your own and tell me, ingenuously and sincerely, were you in my circumstances and had been at all my labour, charge, and trouble, would you like to have your labours surreptitiously forced out of your hands, conveyed into the hands of your declared profligate enemies, printed without your consent, and spoiled as mine are in the impression? Would you suffer your enemies to make themselves judges of what they really understood not? Would not you withdraw your copy out of their hands, trust no more in them, and publish your works rather at your own expense than see them spoiled and yourself laughed at for suffering it?

I see no way to prevent the evil consequences of Dr. Halley's conduct but this. I have caused my servant to take a new copy of my Catalogue, of which I shall cause as much to be printed off as Dr. Halley has spoiled, and take care of the correction of the press myself, provided you will allow me the naming of the printer, and that all the last proof sheets may be sent to Greenwich at my charge by the penny post, and not printed off till I have seen a proof without faults; after which I will proceed to print the remaining part of the Catalogue as fast as my health and the small help I have will suffer me. But if you like not this I shall print it alone at my own charge on better paper and with fairer types than those your present printer uses; for I cannot bear to see my labour thus spoiled to the dishonour of the nation, Queen, and people.

If Dr. Halley proceed it will be a reflection on the President of the Royal Society, and yourself will suffer in your reputation for encouraging one of whom the wisest of his companions used to say that the only way to have any business spoiled effectually was to trust it to his management.

But I hope better things of you, and that you will endeavour to make me easy after all my long, painful, and chargeable labours by affording me your assistance as occasion will serve, whereby you will ever oblige

Sir, your humble servant and sincere friend,

JOHN FLAMSTEED.

P.S.—I forgot to tell you that whereas Dr. Halley pretends that he's corrected faults in my Catalogue by his own calculations, I fear he has rather made some new; for all the calculations on which my Catalogue is built were wrought twice by different persons at a great distance from each other, and sometimes oftener, so that there is little room left for suspicion. 'Tis a plausible pretence, but he mistakes if he insinuates

me guilty of any such fault. I have taken sufficient care to prevent it, and will answer for all the faults in my Catalogue except those made by himself and the printer.

The feud had now waxed hot, and was the talk of the town. The Bishop of Carlisle, writing to Ralph Thoresby, the Leeds antiquary, on December 30th, 1710, says, in reference to this subject:—

I dined yesterday with Dr. Woodward, who had invited two or three very agreeable guests to bear us company. It is not only the State potentates of the earth that are everywhere going together by the ears; but the generals of the *belles lettres* are as fond of fighting. The first hint I had of the misunderstanding among our Gresham College colleagues was from yourself, but now I find that you were modest in your representation; *intra muros pugnator et extra*. Deadly feuds there are betwixt Sir Isaac Newton and Mr. Flamsteed, their disputes rising as high about the first invention of some rarities in astronomy, as ever any did between Dr. Wallis and Dr. Holder, touching the modern miracle of teaching the dumb to speak and the deaf to hear.

Flamsteed next demanded from the Committee the return of the manuscript "Observations" and "Catalogue" which he had deposited in their hands, and which request they positively refused. The breach was now complete, and from the period of that refusal Flamsteed's letters to Sharp are filled with complaints of the conduct of the Committee. Eventually Flamsteed commenced legal proceedings against Sir Isaac Newton for the restitution of his manuscripts. But it is principally on Dr. Halley that the force of his indignation falls; and if the circumstances referred to in the letters be correct, he had just cause for complaint and redress. For instance, he charges Halley directly with having surreptitiously purloined the manuscript "Observations" and "Catalogue" deposited with the Committee, and with having published them in a garbled and incorrect manner; and Sir Isaac Newton himself does not escape some odium attached to this transaction. It is acknowledged that the seals of the manuscripts were broken; but this, it was said, was done by

order of the Secretary of State when the Queen offered to defray the cost of the printing. Flamsteed, however, asserts that the order was obtained *after* the offence was committed. It is certain that Halley did, in the year 1712, publish an edition of Flamsteed's "Catalogue" and of extracts from his "Observations," which is the work alluded to by Flamsteed; and it is equally certain that Halley made use of these very manuscripts of Flamsteed for the purpose; indeed, the fact is not disguised by Halley himself in his edition.

Flamsteed remonstrated against this conduct: he complained that his "Observations" were garbled, and thus rendered of little or no value; and, moreover, that his "Catalogue" was inaccurately printed. He calls Halley a "malicious thief," and bestows on him other opprobrious epithets in his correspondence with Abraham Sharp, which would probably have been withheld had he been aware that these letters would ever again have seen the light. Flamsteed, however, was so determined in his course, and considered himself so much injured and aggrieved, that he did not rest until, in the year 1716, he obtained an order from the King to have the remaining unsold copies of this work delivered up to him, for the purpose of destroying the portion edited by Halley. Three hundred copies (out of the 400 printed) were consequently sent down to Greenwich Observatory, which Flamsteed says he "sacrificed to Truth," and he appears to have missed no opportunity of destroying every copy that subsequently came into his possession.

During all this time no further progress had been made in printing the "Observations." The first volume only was completed, which was incorporated by Halley in his edition, but this did not contain any of the observations made with the mural arc invented and fixed in the Observatory at Greenwich by Abraham Sharp. This, therefore, was the least interesting portion of the proposed work. The second, which was to commence with those observations, was not

yet begun. Flamsteed had, however, printed for private circulation a correct copy of his "Catalogue," in order to counteract the effect of Halley's spurious edition, but no steps had been taken towards forwarding the main work, which had now lain dormant almost ten years, and which was much increased by the numerous additional observations made during that period. At length, not being able to regain possession of his manuscripts, he was obliged to copy them again from the original entries, which was a great trouble and expense to him; and towards the end of the year 1717 he sent the first sheet of the second volume to the press, resolved to proceed with the work at his own cost. Before his decease, which happened on December 31st, 1719, he had nearly completed that volume, having been occupied above nineteen years in connection with the work.

A singular feature attending the ultimate publication of the *Historia Cœlestis* was the suppression by his widow of that portion of the preface written by Flamsteed, in which he refers to the difficulties and obstructions he met with in its publication. In a letter dated May 28, 1717, Abraham Sharp wrote to Flamsteed:—"I should be heartily glad to hear that your preface or introduction to your works or catalogue is printed. Therein I hope to see, though perhaps not a designed and direct, yet a satisfactory vindication of yourself from all the calumnies and aspersions cast upon you." Noting this letter in his "Life of Flamsteed," Baily adds:—"Notwithstanding these earnest wishes of Mr. Sharp, repeated in various letters, the vindication was not printed with Flamsteed's works, and it is now for the first time made public."

Not content with the hardships to which they had subjected Flamsteed during his life, the Government sought, after his death, to obtain possession of his instruments, on the plea that they were national property, but for the

making or in the repair of which the nation had not contributed one farthing ! A lawsuit ensued, in which his executors, Mrs. Flamsteed, and his nephew, Mr. James Hodgson, were victorious. In the end the victors were allowed to take away the instruments from the Observatory, in which they should by all means have been preserved in memory of a conscientious public servant and an indefatigable devotee to astronomical science.

It has been urged that the assumption on the part of Flamsteed, that he might deal with the observations taken in his official capacity of Astronomer-Royal as though they were his own property, could not be tolerated ; that Newton and those who acted with him were acting not as private persons, but as deputed by the Queen to see to the affairs of the Observatory being efficiently conducted ; and that the sealed packet, although sealed, was public property, and might be broken by the Royal command.

Doubtless these were the views held by Dr. Halley's friends, and in justice to his memory the following extract from the preface to his edition of the *Historia Cælestis*, which was committed to the flames by Flamsteed, may be given :—

Almost thirty years had elapsed since Flamsteed had received the title of Astronomer-Royal, but nothing had proceeded from the Observatory with which he was entrusted. Although not idle, he appeared to have laboured only for himself or for a small number of friends.

Prince George of Denmark referred it to Francis Roberts, Christopher Wren, Isaac Newton, David Gregory, and John Arbuthnot to examine the manuscripts of Flamsteed, and to select that part which appeared to them worthy to see the light. This selection was made, and the Prince undertook the printing for the benefit of astronomy and navigation.

The referees made, signed, and sealed an agreement with Mr. Flamsteed for this impression. It was agreed that the work should consist of two parts ; that there should be inserted in it the Observations made with the sextant previous to 1690 ; that the Catalogue should stand first, and that the second part should contain the Observations made with the mural arc. Mr. Flamsteed agreed to revise the proofs and to supply the manuscripts in time.

The work at first proceeded prosperously, but the printing was interrupted, first, because the Catalogue was extremely inaccurate, and then by the death of the Prince of Denmark. The Queen, however, directed the undertaking to be continued, and gave the special charge of it to Dr. Arbuthnot; and Mr. Flamsteed, beside his constant occupation of watching the heavens, having his sight weakened by age, Edmund Halley was selected to expedite and complete the edition. Halley compared the Catalogue, which was the most important part, with the original observations, corrected a number of errors committed by the copyist or the calculator, and supplied numerous gaps. He made over again with care the calculations of the zodiacal stars; he determined from the observations of Flamsteed the stars of six of the most northern constellations, which constitute nearly a fifth part of the Catalogue, and required immense calculations; he also added some southern constellations.

A selection was made of the observations of the planets, which were compared with those stars which came nearest to them in declination. All those in which there was reason to fear errors in the plane of the instrument were rejected, but all the observations of the moon were printed.

A copy of the now scarce (or "spurious") edition of the *Historia Cælestis* published in 1712 is preserved in the library of the Royal Society, Burlington House.

CHAPTER III.

Correspondence between the Rev. John Flamsteed and Abraham Sharp—Sharp's invention of a "way-wiser," or measuring wheel—The latitude of Horton—Newton's *Principia*—The Aurora Borealis, a "remarkable phenomenon"—Destructive hurricane in 1703—Newton's "Treatise of Light and Colours"—Flamsteed's criticism of the work—Sir Isaac Newton knighted—Slow progress of the *Historia Cælestis*—Mr. Kirke, F.R.S.—Lunar Rainbow—Flamsteed's observations of Saturn and Jupiter—Abraham Sharp offered the Mathematical Chair of Christ's Hospital—Sir Isaac Newton stops the printing of the *Historia Cælestis*—Remarkable meteor seen at Horton—Dr. Halley and the *Historia Cælestis*—Sir Isaac Newton and Flamsteed—Second edition of the *Principia*: Flamsteed's criticism—The problem of "finding the longitude"—Ralph Thoresby and Abraham Sharp—Death of Lord Halifax—The "Dancing Sisters"—The Aurora Borealis again seen at Horton—The Rebellion of 1715: consternation at Bradford—Flamsteed destroys Halley's spurious edition of the *Historia Cælestis*—Sir Hans Sloane—Declining health of Flamsteed—Flamsteed's last letter to Abraham Sharp—Sharp's last letter to Flamsteed—Death of Flamsteed.

The correspondence between the Rev. John Flamsteed and Abraham Sharp, which commenced when the Astronomer-Royal was preparing to publish the *Historia Cælestis*, and was continued until his death, covers a period of about nineteen years. The letters of both correspondents are largely made up of astronomical subjects, and include tables of observations taken at the Observatory at Greenwich and forwarded to Sharp at Horton, the latter in turn communicating to Flamsteed the result of his verification of them, or of such corrections as his means of observation led him to

deem necessary. The results were embodied in Flamsteed's Catalogue, and the extent to which that work was indebted to Abraham Sharp's contributions is amply recognised in many of Flamsteed's letters to his various correspondents. Many other matters of mathematical and astronomical import were discussed by the two savants, which, however, at this lapse of time, it would not be profitable on scientific grounds to reproduce. Nevertheless, there will be found in the correspondence subsequently given many letters referring to topics of more than ordinary interest, indicating, as they do, the imperfect knowledge which astronomers of the period of Flamsteed and Sharp possessed as compared with present day attainments. The mysterious character of comets, and even the dread inspired by the *Aurora Borealis*, are gravely discussed, and some attempt is made to account for their occurrence. Little reference will be found to such purely mathematical problems as figure in both Sharp's and Flamsteed's letters, many of them having long ago been made demonstrable to the tyro in mathematics.

As may be readily conjectured, Flamsteed opened his mind freely to his Yorkshire friend on the subject of his unfortunate experience in connection with the preparation of the *Historia Cælestis*, and his letters constitute a continuous record of the trials and difficulties he met with in the preparation of that great work for publication; also his opinions of such of his contemporaries as he believed were in league to prevent it ever seeing the light. Brimful of this subject, Flamsteed alluded to it in almost every epistle he wrote, and almost necessarily fell into the habit of frequently repeating himself.

In endeavouring to give a fair idea of the general tenour of the correspondence between Flamsteed and Abraham Sharp in regard to this and other matters, the work of excision has been severe, in order not to weary the reader, on the one hand, with details upon mathematical subjects now obsolete, or, on the other, to crowd the context with personal matters

querulously stated, and probably somewhat exaggerated—the result, doubtless, on Flamsteed's part, of a frame of mind writhing under supposed grievances and to some extent jaundiced by disease.

Abraham Sharp's letters were generally very practical in character, and were in the main devoted to astronomical subjects, but their perusal will afford ample proof that he held strong opinions in sympathy with his colleague, the Astronomer-Royal, in regard to the latter's grievances, and that in regard to this matter Sharp could occasionally express himself in very pronounced language. Unfortunately there are lapses in the continuity of the correspondence, in consequence of several original letters from Sharp to Flamsteed being absent from the Greenwich collection, and the apparent impossibility of deciphering the shorthand copies preserved at Horton.

The correspondence opens with a letter from Abraham Sharp, which, like all the remainder, is addressed "to the Rev. John Flamsteed, at the Observatory in Greenwich Park, near London," and is post paid. All Sharp's letters are in a neat style of caligraphy, and those subsequently given have been copied from the originals in the Royal Observatory.

Letter from Abraham Sharp to the Rev. John Flamsteed.

HORTON, *February 2nd, 1701-2.*

SIR

I am very sensible of the many obligations you have laid upon me, though unavoidable avocations have so long retarded my acknowledgments. Other important affairs have in great measure diverted me from mathematical studies, yet the same inclination still remains and, when leisure has permitted, hath engaged me. Though little in the theory yet more in the practice, for moving in so narrow a sphere, and at so great a distance from those assistances I formerly enjoyed, my proficiency has been very inconsiderable. I have as strong a tendency to astronomy as ever, but am destitute of convenience for observation. Only have made a small instrument to which I have adapted a 6-feet telescope in the nature of sights, whereby both the altitude and azimuth may be had at the same instant to near one minute of a degree, and being so contrived as to be easily reducible to the form of an armilla, the declination and

hours are readily obtained to the same exactness, and though the weight of the tube in this later position may vitiate the observation, yet have used means to discover and thereby correct the error. This I find commodiously applicable to the observation of eclipses, which I made an experiment of in that of the sun in 1699, though by reason of the thick fog could only see the end, which I found a full hour sooner than the time calculated from Street's tables and yours. Have not had an opportunity to observe any eclipse of the moon, and being unacquainted with the names of the spots, and not having that piece of Hevelius, nor any map of the moon wherein they were truly delineated, am much disabled.

Have sometimes been looking at Jupiter, but, wanting a table of the eclipses of his satellites, know not when to expect them. I have lately procured Hevelius's *Prodromus Astronomiæ*, or his catalogue of maps of the fixed stars, but it gives little satisfaction, being rectified to a time so long since elapsed and not to the exactness I could desire, and am well assured to find in yours when I have the happiness to see it. A friend of mine lately at London gave me great encouragement to expect it shortly. I should esteem it a special favour if, when it is printed, you will please to inform me where or how I may procure one. Shall not insist upon price. For a thing I esteem so highly valuable, upon prospect of obtaining it the money shall be ready. Nevertheless, by your information shall account myself much obliged, and shall be glad of an opportunity to be serviceable to you if anything within my power can contribute thereto.

I have some time ago made twelve new geometrical bodies, several of which have all their bases alike, but in all they are of the same kind, with various methods of cutting them out of the *cube* or parallelopipedon and calculations in numbers adapted thereto. Some of these you may possibly have seen, or have heard of from Mr. Kirk. He was at London about two years ago, whither at his desire I sent three of them to him.

I have lately made a measuring wheel, or odometer,* of a peculiar contrivance, which, without wheels or pinions, keeps an exact account of its way both in miles and chains and parts to the extent of 100 miles, and can easily contrive it to extend to any less or greater convenient number of miles from one to 500 if needed. It gives notice upon a little bell at the end of every mile by one, at every five miles by two strokes. Yet of a small size, not exceeding twelve pounds in weight, most of the work not

* Mr. Sharp had evidently put his measuring instrument to the test. The following is copied from one of his memorandum books, dated 1697:—

"Distance from the garden gates to Horton Chapell, measured by the wheel, June 12, 1696, 5 fur. 8 ch. 28 links, or 1280 yards, wanting just 40 yards of $\frac{3}{4}$ of a mile. (a)

"To Mr. Swaine's, 49 chains.

"To Abraham Balme's, 1 m. $2\frac{1}{2}$ ch.

"To Bowlin Hall yate, exact 2 miles.

"To the lane that goes to Newhall, 190 ch."

[See letter dated July 30th, 1701, p. 30, Chap. II.]

(a) A measurement of the distance between Horton Hall and Chapel House, Thornton Lane taken from the ordnance survey, exactly confirms these figures.

visible, only the figures, but it contains within the compass of a brass plate 7 inches diameter, not above three times common pan thickness, easily portable and manageable, and all the account distinctly visible to the manager's eye as he runs it along. One of this nature lately sold to the Lord Bishop of York for five guineas, but if such a wheel may be advantageous or valuable to you should willingly make and send you one, accepting only your book and maps of the stars in satisfaction for it, and what further of the like nature you may think fit to impart, only humbly crave a few lines in answer, and that a correspondence may be continued, the charge thereof shall, if you please, be defrayed by,

Sir, your most obliged and humble servant,

ABM. SHARP.

P.S.—If I may further trespass upon your civility, crave the favour when you see Mr. White to present my respects and acquaint him that I have perfected both my engines, one for rose and crown work, the other for oval and rose work, and likewise made an engine for cutting wheels; all which in my apprehension are more convenient than any I have seen at London. A. S.

Please to direct to me to be left with Mr. Sam Stansfield, in Bradford, Yorkshire.

The Rev. John Flamsteed's letters to Sharp were generally addressed—

*To Mr Abraham Sharp
at Little Horton near
Bradford in Yorkshire
these p^{ts} sent*

Bradford in Yorkshire

To all the signatures of Flamsteed were appended the initials "M. R.," signifying Mathematical Regius. The following letter, as well as others written by Flamsteed to Sharp, has been copied from the volume of manuscript letters, kindly lent to the author by Major Bernard Gilpin Haines, of Westminster, a grandson of Mrs. Giles, formerly of Horton Hall. The handwriting of Flamsteed is very crude and irregular, and some difficulty has been experienced in deciphering some of the signs and abbreviations frequently employed by the writer. In only a few places, however, have blanks been left where a word could not be made out :—

Letter from Rev. J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, GREENWICH, *February 6th, 1701-2.*

SIR,

I have long desired to hear from you. I intended to have wrote to you, but, having no particular occasion and more work on my hands than I can well perform with the help of a couple of servants, forbore till I should have better leisure or opportunity.

I heard your bodyes were before the Society, but saw them not, particular care being taken, I have good reason to think, that I should not by the Secretary, who, with the help of another friend that you know very well, has filled it with a company of ingenious young gentlemen that are not all of them proper for carrying on the design, and by whom others are carried on that are long foreign to it, which makes me abstain from their meetings ; but I have a greater reason—the saving or gaining of time for my own laborious employment. My business succeeds—I bless God for it—very well under my hands, but not at that rate that some people out of a malicious design represent it. They have emissaries that understand nothing of the business that sometimes visit me, that they may give them an account of my pains, which they turn as they please. I receive them and use them as Scipio did Hannibal's spys—show them what they desire, and dismiss them smiling, for I wish they understood all as well as they would be thought to do. I shall give you a just account of the state of my studys as soon as I have done with your letter.

Pray let me know the radius of the new instrument for taking heights and azimuths, and, if it be not a secret, a sketch of the contrivance. You say it shows both to near a minute, hence I guess 'tis about two foot radius, and then a six-foot glass applied to it will make it warp with its weight. In such like instruments the telescope ought not to be made longer than the radius of the instrument.

Pray what's the latitude of Horton and the difference of meridian from London in your opinion? I will take a little pains to satisfy you when you acquaint me.

My man has calculated the eclipses of Jupiter's satellites for four years to come. I shall send you cyps of them or the numbers I use at present that you may compute them yourself. But I covenant with you that you shall not impart any observations I send you without my consent to any persons whatsoever, nor any tables. I had an emissary here at the solar eclipse who, as a friend, would have sponged the time out of me. I knew it, and civilly dismiss him without it. I have great reason to be thus cautious, which I am sure you will approve when you shall know it, and that you may in a little time.

As for your *odometer* or *way-wiser** I doubt not it is very ingeniously contrived and well wrought, as everything is that comes from your hands. Sir Jonas Moor gave me one, which you saw when here. I am not yet either wealthy enough to keep a coach nor so infirm as to need one, but to encourage you, whenever I do it I design to have no way-wiser in it but of your make and contrivance.

I shall acquaint Mr. White when I next see him that you have perfected both the engines for rose and oval work, and now I think I have said as much to your letter in all other particulars as it requires. I shall now acquaint you with the state of my new catalogue of the fixed stars.

I shall spare neither cost nor pains to bring out my work, on which I am about £1000 out of pocket already; but I will not prostrate my wealth and pains to the pleasure of those who only talk and judge impudently of what they understand neither the nature, pains, nor cost. But of this more hereafter. At present I shall only tell you that J. Hudson (who is a very good algebraist, and understands both sines and fluxions well) tells me he has seen in London, at the Press, a treatise of these, wrote by one Mr. Cheyne, a Scotchman, of which his countrymen make great boast. 'Tis about eight sheets, and will be printed with the same letter that Mr. Newton's book is. Dr. Gregory's Astronomy will be finisht, according to his proposals, at Oxford, by Midsummer next. A treatise on conic sections is also in the Press, by Mr. Mills, whom I think you once saw here. Mr. Halley is trying to get command of a ship this summer. He loses his credit daily, and his friend† does not increase in his. I have wrote a long letter because I had a deal to tell you. Pardon this fault, and I shall not willingly give you cause to complain of his committing the like again who is ever your friend to serve you,

JOHN FLAMSTEED, M.R.

Properly rendered, a way-measurer.

† Presumably Mr. Isaac Newton.

Extract of Letter from Abraham Sharp to J. Flamsteed.

HORTON, February 17th, 1701-2.

SIR,

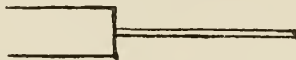
Nothing could be more acceptable than your obliging letter, wherein your unmerited civility, far exceeding my expectations, renders me incapable of making any adequate return. I cannot rest satisfied in mere verbal expressions of gratitude, yet that is the best I have at present to offer, but I know it is not that which you expect.

My instrument is but small, yet as large as my materials and convenience would admit. Having no fixed place to secure it from weather and other injuries, must upon every occasion set it anew and remove it, wherein and in making observations I have no assistance.

There is no mystery in the contrivance; were it a secret it should not be so to you. It consists—

1st. Of a circle of iron 20 inches diameter, the limb covered with brass, turned to a true plane.

2nd. In the centre turns an axis of iron, somewhat above two feet long, one and a-quarter inch thick, truly turned; its upper half stands above the plane of the circle, forked at the top in this manner—



so that

3rd. A semicircle of iron whose limb is covered with brass, 26 inches diameter, fixed to an axis that turns between the grains may move steadily and truly against the side of the great axis.

On the edge of this semicircle is fixed an iron plate about 28 inches long, to which the cells with the glasses and threads are screwed. This circle when placed horizontal will by the axis (to which an index is fixed) and its semicircle serve for the azimuth and altitude. But to accommodate it to show the hour, &c., on the back of the circle, perpendicular to its plane is fixed a quadrant of iron, on the limb of which, at the beginning of the divisions, is a socket that receives the end of the great axis, which hereby is entirely suspended on a circle, which hanging by two strong iron pins fixed at the opposite 90 degrees in a substantial frame of iron, is rendered voluble to be set by the quadrant (being placed in the plane of the meridian) to any angle of elevation or parallel to the equator, carrying its axis with it, which now represents the axis of the sphere. All this you will easier apprehend than I can express. Hereby you perceive the telescope properly appertaining to the instrument is little above 2 feet: the other of 6 feet is only screwed to that, being rendered hereby more convenient and manageable, and was chiefly designed for viewing Jupiter's

satellites and eclipses, for which the other was too short. The limbs of every part are divided diagonally from a large quadrant, 60 inches radius, in some measure participating of the same exactness and compensating the smallness of their radius.

To place the instrument, have a long meridian line found by a perpendicular, and a lanthorn set on the battlements of a turret, about thirty yards distant, directed by the pole stars passing perpendicularly over Allioth and Cassiopeias Hip. That space divided into twenty-six parts and fifteen set off from that of Allioth gives the true meridian, which I also confirmed by observing the pole stars utmost elongations east and west. By this instrument I can readily find Venus at any time if above the horizon in a clear sky and 3^d distant from the sun. Have seen Arcturus, the sun being a considerable height, but Sirius could not, for the trees that encumber the south part of my horizon. In observing the azimuth can safely confide in it to its capacity for the hour, though in some positions it be liable to warp, yet judge it more convenient and exact than Mr. Molyneux's telescopic dyall.

The latitude of Horton I determined long ago upon many observations by my 5-foot quadrant to be 53 degrees 51 minutes. The difference of longitude from London I have guessed to be about 5 or 6 minutes. Have long desired it to some certainty.*

. . . If you should judge it necessary, my desire is to serve you, having already gone through some seemingly as laborious computations in a table of logarithms to sixty-four figures, sufficient for extracting any simple root by Mr. Halley's method, No. 216 of the Transactions, a specimen whereof appears there. Have likewise, from Mr. Newton's series expressed in Dr. Wallis's Algebra, computed the proportion of the diameter of a circle to the circumference to seventy-two figures (viz., double to Van Ceulen's) by two different methods for confirmation.

Your most obliged humble servant,

ABR. SHARP.

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, GREENWICH, *February 28th, 1701-2.*

SIR,

I thank you for the brief description of your instrument. I apprehend something of the contrivance, but not how you can direct the telescope on the semi-circle, except it turn on a centre. A short sketch

* The latitude and longitude of Horton, taking the grounds of Horton Hall as the standpoint, are given in the ordnance survey as follows:—N. latitude, $33^{\circ} 47' 6''$; W. longitude, $1^{\circ} 45' 36''$, or $7' 2''$ difference from London.

of it at your leisure would make me master of the contrivance. I am obliged to you for the latitude of Horton,* your account of the solar eclipse, and your estimated [difference] of meridians from the Observatory, but give me leave to remind you that, by reason you are more to the North than this place, the moon's parallax prolonged the exit of the moon from the sun's disc in the solar eclipse, and so gave the [difference] of meridians bigger than it really is perhaps by a minute or two. I have a construction of the eclipse by me, in which the diameter of the sun's disc is about 6 inches. I shall inscribe the parallel of Horton on it, and send you my determination when God gives me a little better health.

The places of the fixed-stars of my catalogue are rectified to the beginning of the year 1690, when you lived with me, and when the groundwork observations were got, you assisting. I forgot to intimate the year to you in my last, till it was gone from here, then I remembered my fault, for I would not conceal anything of this work from you. Though in a like specimen I sent to some other ingenious men I purposely omitted it, because I would not have anything of it printed but by myself, and when I have revised, perfected, and completed the whole.

My tables of right ascension and declination are calculated no further than 65 degrees of latitude. If you think fit to continue them by putting them to 70, 75, 80, or 85 degrees, I shall give you mine to fill up yours betwixt 35 and 65 in exchange for them, and then the table will be complete. I find you have got the most compendious way of calculating them by prosthaphereuses. It was known of old, but at present I think there are none but you and myself that use it, though it be the most convenient that can be in many cases. I assent altogether to what you say concerning calculation. It is impossible to avoid error where the differences are not to be had except by a careful repetition of the work, and it was for this reason that I caused you to calculate so many places of the moon before me that I might be assured of the truth of the calculation by my repetition. The same method I have used in my catalogue. All the stars' places were calculated by Mr. Leigh, in Derbyshire, and repeated by J. Hudson here, and the errors of each—which were at least one in ten, that is, one in five betwixt them—corrected by myself, and yet still I think it convenient to give the zenith distances and right ascensions in time first determined by myself, lest I should have committed any fault in taking them. We are men, and humanity is not infallible.

I never receded from the sun's parallax of 10 seconds, nor know I any reason why I should. Mr. Newton would make it 40 seconds, or 24 seconds at the least. Either you mistake Mr. Whiston, or he has misapprehended me. It may be less than 10 seconds, but I

* Wrongly given as 33° instead of 53° in a footnote on preceding page, and only discovered after the sheet had gone to press.

know no observations that will make it bigger, and Mr. Newton remits a many of his former notions, and will take it ill to be held to his determinations in his *Principia*, now he knows that the force of gravitation in the moon causes our tides but so many inches as he supposes it did feet in the American Pacifick Ocean.

I do not pay for the postage of my letters because I would have them come safe to your hands. I desire you not to pay for yours for the same reason. If you do after this advice, to be revenged of you, I shall pay for those I send you hence, and then the Post-master will not take much care of them. I desire to oblige you, since by yours I find how ready you are to oblige

Your friend and servant,

JOHN FLAMSTEED.

Under date "Horton, May 19th, 1702," Mr. Sharp refers to the inconveniences he laboured under in obtaining his supplies from the Metropolis and the frequent delays in transit, which references form curious reading in the light of the present expeditious modes. After thanking Flamsteed for the receipt of charts, &c., Mr. Sharp writes:—

Last week I received a letter from Mr. Kirk, who resides at the Golden Harp, near the north tower of St. Paul's. In it was enclosed one from Mr. Raphson, who writes that he is intrusted with correcting the press for Mr. Cheyne's book of Fluxions now printing, and tells me it will be, he fears, three months ere it is finished, there being when he writ not above three sheets printed off.

He promised to send me a book when it is done, but am justly suspicious he knows not how to send, since of the like promise of the last edition of his Analysis it was neglected, and had I not engaged my old friend, Mr. Speidell, since dead, to call for it, though he got it not without considerable trouble, I fear I should have lost it; and he has in this neglected to inform me how to write to him, so that I am not now capacitated to give him account how to send or return him this. So that my hopes of it will be frustrated, except you be pleased that some of the servants, when they go to London, may enquire him out. He may probably be heard of at the printer's, and if they give any information how to send to him, or, which will be better, receive the book of him when it is ready, knowing that it is in your hands, I shall be secure of it.

Having occasion for telescope sights for a small instrument or two, request the further favour that your servant may procure for me of Mr. Yarwell, or whom else you see fit, two objective glasses, one to

draw about 18 inches or 20 inches, the other about 24 inches or 25 inches, and about 1 or $1\frac{1}{4}$ inch in diameter, and two convex oculars, drawing about $1\frac{1}{2}$ inches or less, and $3\frac{1}{4}$ inches diameter, such as I had formerly from Mr. Yarwell. Likewise, a short object glass drawing about 9 inches, and a concave ocular suited to it, but no case, since I can make that myself. This being for a pocket perspective to assist my eyes, which I find now sensibly decaying, having formerly presumed too much upon them, and excessively, nay, sometimes unnecessarily, strained them. I know those whom you employ can best manage the glass grinders, who are ready enough to impose on such as have not judgment both in price and goodness. Therefore assure myself all due care will be taken that they be good, and every one tried. If they be ready to be sent with and wrapped within the above-mentioned book, it will be time enough. What the charge is, upon notice, I shall send by the carrier whom I have sometimes intrusted with business of like nature, and shall ever look upon myself to be,

Sir, your most obliged and humble servant,

ABRA. SHARP.

In a postscript, Mr. Sharp writes :—

The bookseller I deal with here, whose name is Benjn. Bartlett,* a Quaker, corresponds with one John Sprint, at ye "Bell," in Little Britain, who constantly sends every month as soon as ye *Mercurys* come out for paper or other things. I doubt not he will take care; for books it is more certain, since he expects benefit by such things. I am not sorry you missed sending by Mr. Kirk. It would have been more dissatisfactory, since living at several miles distance, rarely coming into these parts, and he frequently from home, it might have cost me several journeys ere I had met with him, and it might probably been half a-year before the things reached me.

The precautions thus taken ensured the safe arrival of the much-coveted book, and in return Flamsteed requests a supply of Yorkshire quills, the excellence of which he had apparently

* "Benj. Bartlett was a surgeon in Bradford. His son of the same name was also a medical man who removed from Bradford to London. He was much acquainted with coins, with which, and with books, he frequently supplied Dr. Richardson, to whom he was a regular correspondent. Elizabeth, the daughter of the elder Mr. Bartlett, married Henry Gurney, of Norwich, the son of that John Gurney whose portrait was engraved in 1720, accompanied with ships sailing and sheep feeding, in memory of the services he rendered to his native city. Their only son, Bartlett Gurney, Esq., F.S.A., was an eminent banker in Norwich."—*Richardson Correspondence*.

It is evident from Abraham Sharp's reference, that another member of the Bartlett family was a bookseller in Bradford.

tested previously, and Mr. Sharp sends him by Atkinson, the carrier, two thousand quills, "the best the country can afford, being at present somewhat scarce." In the subjoined letter Flamsteed displays somewhat of that animus which mars his later epistles which have reference to his work, and the difficulties he had begun to encounter :—

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, February 9th, 1702-3.

SIR,

I have yours of the 30th past, and must acknowledge myself very much obliged to you for the pains you have taken in resolving my problem. . . .

You need not be shy of letting anybody know that I have the tables and the catalogue of the stars' places in such forwardness by me. I desire it should be known and spoken of by such persons as you, that know the pains and labours required to make the observations, first; and then to derive the catalogue of planets' places from them. I desire to have that published as soon as may be, and in order to it that you speak freely of them; but I desire that no copies of what I impart to you be given abroad, lest Captain Raymer should say they need no more, and thereby hinder me from procuring an allowance for publishing the whole. The charge of the plates and press will not be so little as a thousand pounds. I am more money than £1000 out of pocket already in making instruments and having help to manage them, and work up the observations made this twenty-six years. It is but just the publick should defray all this charge, yet I ask no more [than] to have help to copy my papers and books for the press, and to finish some necessary calculations and tables, and to print them at my own charge, and I have some hopes of obtaining it. God's providence brought me to this work. He has prospered me in it, and I will not doubt that he will give it a happy conclusion.

Now I have told you for what reason I would not have what I impart to you communicated to others. I hope you are satisfied that it is not out of my reserved humour (as Mr. Newton's friends give out, who would have obliged the narrow soul at my cost), but only to do the public great service and give it the honour of my pains, to whom (and not such self-glorious persons) it is due. It is known very well whence he had his materials and principles. He makes but a small figure now, and will probably make a less in a little time, though had he been wise he might have made a much bigger than he did formerly. But enough of him (in whom the justice of Providence is remarkable). He pretends to have left his mathematical studies. I leave him therefore to his other.

We are like to be overwhelmed with treatises of fluxions. Mr. Cheyne's is not yet extant, but a Nonconformist (Mr. Ditton) I am told has a piece in the press, and one Mr. Hayes, a Scotchman, has one too on the same subject. Assure yourself that as anything of this kind comes out it shall be sent you, or at least a just account of it,

By your obliged real friend and servant,

JOHN FLAMSTEED.

The following epistles discuss the appearances of the *Aurora Borealis* and sun spots. Read in the light of present knowledge upon the subject, they are decidedly amusing.

Extract of Letter from Abraham Sharp to J. Flamsteed.

HORTON, *March 30th, 1703.*

SIR,

Though news be scarce in these parts, I send you a piece I presume not common. The 24th inst., between the hours of nine and ten in the evening, there was seen here a very remarkable phenomenon. The air being very calm and clear, except in the north, where a black cloud, the middle whereof was near N. by W., seemed to cover a sixth part of the horizon. The upper extremity of this cloud seemed as perfect an arch of a circle as a rainbow, and edged round with colours nearly the same,* the middle of it being about eight degrees or ten degrees in altitude. Round this edge issued out in all parts very bright rays, like those of the sun passing betwixt two clouds or a comet's tail, but giving a light so clear that some who saw it affirm they could have read thereby a small print. These rays, from their first appearance, did shoot out further and further gradually, till some in the middle were judged to extend as high as the pole star, but, what was more remarkable, they were in a continual rapid motion, as if the cloud, turning upon a centre, had carried them along with it from west to east with so great a velocity that the ray which seemed to ascend in the west in little more than a minute's time would be hurried to the eastern part of the cloud. This continued about seven or eight minutes, and the rays seemed to disappear about three or four seconds, but return again for four or five seconds' space, but not to the same brightness and length as before, and then suddenly vanish, so that the duration of the rays was but about a quarter of an hour, but the cloud still remained, and a considerable light above it, which descended gradually till about half an hour after the cloud wholly disappeared. But the light remained two hours or more till the moon was risen, whose shining did not presently obscure it. I watched

* These colours Mr. Sharp rectifies in a subsequent letter.

it till eleven o'clock, and then observed it was moved considerably more eastward, but the brightness was much diminished. I did not indeed see it myself when clearest, but received most of this account from an intelligent person of the same family, being a physician and philosophical, not at all credulous or fanciful, but rather the contrary, who would have been too apt to have ridiculed such a thing as a fancy had he not accidentally been abroad at that instant, and so a spectator of the whole. I know not what to judge hereof. At first was ready to conclude 'twas only some vapours ascending from a river at three or four miles distance from us, whose course is answerable to the motion of the rays directly over which it appeared, since over this river it is usual to see vapours hang like thick clouds many summer mornings, but have since heard that the same was observed many miles beyond in the north, and have reason to believe it was much more considerable further northwards.

Would gladly know your sentiments concerning this, whether such a thing has ever been taken notice of. To me it seems new and strange, having never, that I remember, heard or read of anything like it.

We have had very bad weather ever since till this day, which has been tolerably fair. What else may be the consequence time may discover.

Meantime, I am your obliged, humble servant,

ABR. SHARP.

Letter of J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *April 8, 1703.*

SIR,

I have yours of the 30th past. As to the problem, it sticks with De Moivre. Rowley, the instrument maker, put it to Mr. Hayes, who pretends to have done it, but has not. De Moivre finds a great fault with Dr. Gregory's Geometry, as I do in his Astronomy, and a many in Cheyne's, of which I expect an account, and shall transmit it to you as soon as I am master of them. He promises to print them in the Transactions. He is an honest and abler man than any of them, and I am apt to believe the Secretary of the Royal Society is not now so much a friend to the Scotch as to deny him the courtesy of a letter to expose them in those parts.

Mr. Halley* has been at the Hague, Vienna, and the bay of Trieste

* Edmund Halley began to apply himself to astronomy at a very early age, and before he had reached twenty had written a memoir on the problem of Kepler, and had made many observations of Jupiter and Saturn. With a view of forming a catalogue of the Southern constellations, he set sail for St. Helena in 1676, and remained there two years. This catalogue was published in 1679, and contained, besides the positions of 350 stars, an observation of the transit of Mercury over the sun's disc, and other interesting features. After being made a Fellow of the Royal Society in 1679, he set out for Dantzic under its auspices, in order to judge of the

to view the harbour of Bockhara, which he says has eighteen fathoms of water in many places, and good and safe anchorage for 100 sail of the largest ships. He has kissed the Emperor's hand, and had a ring presented to him of about £100 value—some say much more, some less. He returned on Thursday last, but what other novelties he brought with him I heard not. This voyage has brought him into play, and got him moneys. If he make a good use of it he may be happy, but I am apt to think it will turn otherwise, except he be wiser than he has been hitherto, which I pray God he may be.

As to the appearance you and your friend saw on the 24th past, it is called the Aurora Borealis.† 'Tis common in Scotland, Denmark, Norway, and Sweden. When the then Duke of York was in Scotland, about Christmas, 1681, they saw one, and Sir John Morden wrote the following account, and it was brought me hither for my opinion of it, which I gave them, and the Court was well pleased with it, namely:—That the moist particles of the air, being carried higher in the atmosphere and spread broader than usually, made (by the gradual inclination of the sun's rays through them) that unusual appearance of light, and the violent motion of the pellucid particles of water in the air caused the streams seen to change so strangely. I inquired, further, if any colours appeared in the light, but could hear of none. Yours is much more particular, and may be of good use in discovering the true reason of the appearance. You tell me of an arch of colours like the rainbow, and a cloud seen at the same time in the place from which the streams proceeded, of which Sir John Morden's relation says nothing. I am apt to think that all these auroras have some such base from which they proceed as yours do, though it was not taken notice of before. Gassandius somewhere in his works has given an account of one seen, as I remember, in France, and makes a great wonder of it. I esteem it no other than a vast halo about the sun. If you remember, Mr. Huygens shows in the Transactions how the mock suns are formed. I believe this Aurora is made in some such

observations of Hevelius. In 1680, while on a journey to Paris, he saw the celebrated comet of that year in its return from perihelion, being the first who perceived it since it was lost the preceding month. This body he observed with Cassini in Paris, and the observations then made are remarkable as forming part of the foundation upon which Sir Isaac Newton in his *Principia* verified his deduction of a comet's orbit from the theory of gravitation. Among other objects of speculation Halley considered the law of attraction, and having applied in vain to Dr. Hook and Sir Chris. Wren for assistance in the mathematical part of the problem, he heard of Newton, then at Cambridge, and paid him a visit. Finding all he wanted among the papers of Newton, he never rested until he had prevailed upon him to publish his *Principia*, of which Halley superintended the printing, and supplied the well-known copy of Latin verses which stand at the beginning. In 1698 King William gave him a commission of captain of the navy, with the command of a small vessel, in order that he might observe the variation of the magnet, and the longitude and latitude in the American settlements; and in 1703 he succeeded Dr. Wallis in the Savilian Chair of Geometry at Oxford. In 1713 Dr. Halley became secretary of the Royal Society, having been assistant-secretary for twenty years before. In 1720, after the death of Flamsteed, he was appointed Astronomer-Royal. He died in January, 1741, in the eighty-sixth year of his age.

† See also Correspondence on this subject March 17th, 1715.

manner, and if you have the number for June 20th, 1670, you may there, perhaps, derive the true reason yourself.

I am the more inclined to believe it proceeds from some such cause because of the weather that followed. It rained and blew afterwards all the afternoon, and continued till night, which, with the next and two or three days following, was very stormy. You will find in Sir J. M.'s account of the Scotch Aurora that it rained at the very time of it. I have observed that always after we have had mock suns the weather has been very cold and stormy; and, it being so after this Aurora, there may be something of the like cause, but I leave you to judge of it after you have perused Mr. Huygens' aforementioned discourse, and am,

Your affectionate friend,

JOHN FLAMSTEED.

The following is the note addressed to Flamsteed and alluded to in his letter:—

EDINBURGH, *December 4, 1681.*

I had not time the last week to tell you of something that to us that have not been long in this country seems strange, but the people of this place say happens very often. On the 29th of last month, looking out of the Dutchess's window to see what weather it was, I saw towards the N.E., along the horizon, a light, just as if it had been break of day (it was then about a quarter past eleven), and gave as great a light. I went then into the drawing-room, and, looking out of the window, could see more north, and saw several streaks of light like the tail of a blazing star, all pointing north and south, one of which was as long or longer than that we saw last year, for it reached from the horizon and past between Charles's Waine and the North Star, and reached up just over our heads. The small ones sometimes disappeared, and then we saw others of the same dimensions appear in other places. They were all near the great one—two of them seemed as if their light had come from the two gards in Charles's Waine, and when they vanished others appeared more south. I went to the other side of the house, and saw that the lights reached from the west or W.N.W. by the N. to the E., or E.N.E. I did not goe out, because it blew very hard, and was very wet, contenting myself to see it out of the house, but sent my man up the hill, who saw the same.

In a letter dated Horton, June 29th, 1703, Abraham Sharp thanks Flamsteed for his explanation of the Aurora Borealis, and says:—

Though I have heard of some unusual light some time since in Scotland, have never had any particular account of such before. I find

that the lights generally were of the same kind, though much rarer here [at Horton] than so far North, for which what you suggest of the higher ascent of the moist particles in the atmosphere in those colder climates seems a sufficient reason. I could not but readily assent to your opinion that it is an arch of a halo about the sun, which its position—answering nearly the time of the night—and its motion, which I observed to be continually more eastward, seemed to confirm, and this motion taking in the former will, I think, fairly account for all the phenomena, except that violent motion, as my friend who saw it will needs have it, rather than what you term it, the changing of the rays or streams from west to east. . . . I have been discussing with my friend about the Aurora Borealis, though, ever since the night it appeared, have found him much averse to any discourse about it, probably because so many extravagant reports were spread abroad concerning it by ignorant country people here who saw it, to which he would not seem in the least to contribute, but your account of the original and reason for it rendered me more free. I perceive it was through my misapprehension that I mentioned the colours, for he affirms that he did not observe any, neither near the black cloud where the light was more resplendent and intense nor in any of the rays, and I am very much satisfied you put me about this further inquiry lest the mistake should be dispersed and perpetuated

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, July 3rd, 1703.

SIR,

I return an immediate answer to yours of the 29th past, because this week, since communicating last, I have seen spots on the sun which, though they are no novelty to me, may be so to you. They are advanced a little beyond the middle of the sun, so that if this letter meets with a speedy conveyance you may find them before they turn out of him, though they change their shape daily, which makes me think they are shadows, and will scarce continue another revolution. We have seen them ever since the middle of May, and in June one of them returned that was a pretty dense one. I expect to see it within his antecedent limb again this day or to-morrow.

There is nothing to be learnt from them but that the sun turns round an axis inclined to the plane of the ecliptick, about 83 degrees over the 7th or 8th degree of Pisces, and makes a simple revolution or *ad fixas* in about $25\frac{1}{4}$ days, as I have told in the preface to my "Doctrine of the Sphere," and therefore I am not careful to take any further notice of them, since they seem to signify little or nothing to us.

I am glad you have rectified your account of the Aurora Borealis. The colours you told me of perplexed me much how to solve them. We

see no halos about the moon with colours at the distance wherein the arch appeared, but we see some faint ones in circles at lesser distances. You have leisure, and may do well when you see them again to consider them well and the reason of them. I want leisure for such an inquiry.

Your affectionate friend and faithful servant,

JOHN FLAMSTEED.

The following letters between Flamsteed and Sharp fairly exhibit the sympathetic feeling existing between the two friends and coadjutors:—

Letter from Abraham Sharp to J. Flamsteed.

HORTON, *December 7th, 1703.*

SIR,

I am very sensible of your excessive though unmerited civility to my relations* when with you, upon which, instead of making any compensation, am still likely further to trespass, yet find myself to my no little regret exceedingly deficient in what may be any tendency to gratify you. I have not been negligent in attending and observing the satellites' eclipses as often as there appeared any probability, but have been extremely unfortunate, chiefly by badness of the weather, there scarce having been one clear day here since I received your last, but for the most part close, dark, rainy, or stormy, so that have but obtained two tolerable observations amongst many attempts, though I have watched and hoped for more ere I was willing to transmit these, yet am forced to sit down under a disappointment, and, what is worse, the fear of your displeasure and the denial of another catalogue of eclipses for the ensuing year, since I have made so sorry an improvement of this, but if I could render you sensible of the many inconveniences I labour under, and the pains I have taken already and still must take ere I can remove them, my excuse would be more easily admitted.

The last year Jupiter ran not so high but I could without much difficulty observe him within doors at a casement, but this year he has got quite above my reach, so that I have been constrained to attend him without doors. For some time had the convenience of resting my telescope on some old apple trees in an adjoining orchard, by the help of which I made a tolerable shift, but since my nephew,† after his return from Leyden, designing to bring the garden into better order, has cut them all down, I have been forced to contrive and make a large tripod, or three-legged staff, about 8 or 9 feet high, of strength sufficient to support

* Robert Stansfield and his wife, of Bradford.

† Dr. John Sharp.

the tube I use, which is 16 feet long, by which I can raise and turn it with little trouble, but have not yet a screw frame whereon to rest the other end, which I cannot procure here but must be forced to make. Other conveniences I propose to myself, and shall not grudge the labour and charge provided I may still retain your favour and you be pleased to impart another table for next year, without which all will be of no purpose.

I am very glad so ingenious a person has undertaken to abbreviate the new *Methodic Transactions*, a work I have long desired and hope may some time possess. Mr. Ditton's undertaking will be no less acceptable, yea rather more, since those tracts are in fewer hands and some in foreign languages. If he accomplish, 'twill be very valuable. Am sorry that Mr. Ditton's treatise of fluxions is laid aside. De Moivre designs to publish a piece of that nature, which I question not will be preferable to anything of that kind yet extant.

Nothing further at present occurs worthy your notice, but that your health may be confirmed and continue, and your affairs succeed, is the hearty desire of

Sir, your most obliged and humble servant,

ABM. SHARP.

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *December 18th, 1703.*

SIR,

I received yours of the 7th inst. a week ago, but having some business on my hands that goes not as I could wish, and a couple of young gentlemen pupils in my house, I could not get leisure to answer it sooner. You may always assure yourself of all due respects from me on good occasions, and that without compliment I am ready to serve you whenever a good opportunity presents itself, and therefore I shall send you the next year's eclipses of Jupiter's satellites before it enters. I often desire to write to you, when the matter I wish to write of seems not weighty enough to fill up the post charge. To fill up this I shall give you what news I have that may oblige you.

The public papers have told you of a violent hurricane that happened here this day was three weeks in the morning. It threw open the cover of the sextant, else it had broke it, broke down all my chimneys, and carried the bricks of that on the east side of the roof against the eastern out wall of the yard. The western chimneys falling on the leads, kept them from being torn off by the violent wind. The south and north windows in the great room were miserably torn, and the others escaped with some, but not inconsiderable damage. The house

at the further end of the yard is all untiled, so that £10 will not repair the damage. I was told that the hurricane raged also in France, and that Paris looks as if it had passed through a bombardment; as also Rome. What hurt the navy has suffered we hear not, but fear it must be considerable.*

De Moivre's tract against Sheene goes on. Dr. Wallis is dead. Mr. Halley expects his place. He now talks, swears, and drinks brandy like a sea captain, so that I much fear his own ill-behaviour will deprive him of the vacancy. Last St. Andrew's Day Mr. Newton† was chosen President of the Royal Society, and your successor, Mr. Hodgson, a member. My affairs suffer me not to attend the society. They have a limb of me, however, but he is honest and discreet, and I believe and hope will not serve some men's small designs, as they expect he should. Subscriptions are offered for Mr. Hayes's book of Fluxions. The author is gone to Germany, but the work will be printed by Lady-Day next. I would send you one of the papers, but that I think it not worth the postage. I have lately been bit by subscriptions, therefore resolved for the future to wait the publication of the book, and see it, before purchase.

The ill weather and accidents hindered me from observing those eclipses of Jupiter's satellites you saw at Horton. Pray continue your observations as oft as you have good opportunity. I shall make them myself or by my servants here, that I may have a good many, to compare them with yours and settle the differences of our meridians, which will determine a great many eminent towns about you, particularly Leeds,

* This paragraph has reference to the remarkable storm of wind which occurred on November 26th, 1703, and which was particularly destructive in the Metropolis, the damage it occasioned in the City alone being estimated at over two millions sterling. Several persons were killed by the fall of buildings, and over 200 were wounded. All the ships in the Thames were driven from their moorings but four, and the destruction at sea was awful. Twelve men of war, with 1800 men on board, were lost within sight of shore. It was in this memorable storm that the Eddystone Lighthouse was swept clean into the sea, carrying with it the body of its builder, who, it is alleged, had prayed for such a storm to occur that his work might be fully tested. Greenwich Observatory seems to have suffered in the general wreck, as its elevated position would almost render certain.

† Mr. Newton was admitted a sub-sizar at Cambridge in 1661, became scholar in 1664, and took his degree of B.A. in 1665. In 1667 he took the degree of M.A., and succeeded Dr. Barrow as Lucasian professor of mathematics in 1669. The interesting inquiry which he pursued into the law of gravitation while in retirement at his native village, during the raging of the great plague, is matter of history, and needs no discussion here. In 1686 he communicated the leading propositions of his *Principia*, published in 1687 through the persistence of Dr. Halley, the cost being defrayed by the Royal Society. In 1672 Newton was elected a member of that body; in 1687 he was appointed one of the delegates to defend the privileges of the University of Cambridge against the attacks of James II., and took his seat in Parliament as one of the representatives of the University. He was again returned in 1703, but lost his election in 1705. In 1695 Newton was appointed Warden of the Mint, and four years afterwards was appointed to the mastership of that establishment. In 1705 he was knighted by Queen Anne. He died at Kensington in March, 1727, in the eighty-fifth year of his age.

near which Mr. Gascoigne dwelt, and the parts of Lancashire next where Mr. Horrox and Mr. Crabtree resided.*

I bless God for it, I enjoy my health. May He who has kept me all my life, keep and preserve you ever.

I am, yours to serve,

JOHN FLAMSTEED.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, February 13th, 1704-5.

SIR,

Your silence has cast me into no small perplexity. I sent above three weeks ago, chiefly to make apology for my own delay, and under great fears lest it should have miscarried. Therein I gave you some account of my irreparable loss of the nearest and dearest kinsman I had, a nephew, very promising, buried in the flower of his age, his death being attended with such circumstances as very much aggravate the loss and grief, whereby I am at present involved in a crowd of worldly business, which deprives me of much of the liberty I had before, so that I have made but few observations of Jupiter's satellites, though I have not been nor shall be wanting to watch all opportunities my affairs will admit of, yet I can as yet but promise little of this nature, and considering the uncertainty and deficiency at best of my observations to depend upon me would be to run the risk of disappointment, though I will not neglect anything that lies in my power for your satisfaction. If there be anything in calculation or for transcription, or whatever else may tend to advance the printing of your observations, which at this distance I am capable of, you shall find me ready to improve all the leisure therein my present circumstances will permit, expecting no more advantage therefrom than to have satisfied some part of my obligations. I hope in a little time ye affairs now in dependence may be so far settled as to admit of greater freedom and leisure, which shall be employed to the uttermost in your service by

Your most obliged humble servant,

ABR. SHARP.

* Mr. Gascoigne was a country gentleman, residing at Middleton, in Yorkshire. He was a good astronomer, had considerable skill in making astronomical instruments, telescopes especially, and was the inventor of the micrometer. He was killed at the battle of Marston Moor. Mr. Crabtree was a native of Broughton, near Manchester, and pursued astronomical studies with great avidity. Horrox was his intimate friend and neighbour, having been brought up at Toxteth, near Liverpool. The transit of Venus over the sun's disc, in 1639, was seen for the first time by Horrox and Crabtree.

† See Sharp's letter of January 22nd, 1704, p. 28.

*Letter from J. Flamsteed to Abraham Sharp.*THE OBSERVATORY, *March 30th, 1704.*

SIR,

I have been employed of late in calculating about twenty eclipses of the moon, observed by myself here with Mr. Halley, or the French (few others being to be relied on), from my new tables fitted to Mr. Newton's additions to and corrections of my old and the Horroxian theory.* I think I told you formerly that these erred eight or nine minutes of longitude extra Syzygias. I can now tell you that in the first eclipses I calculated they erred twenty minutes of time in the beginning and end, in some more in others less, afterwards. You see what their great boasts of answering my observed places of the moon within two or three minutes come to. The calculations have been twice repeated.

You will admire perhaps this, but it will raise your admiration more when I tell you that Mr. Newton's Treatise of Light and Colour is now extant, and there is something in it that is a necessary consequence (as he thinks) of his doctrine, which yet is absolutely false, and will cause a great many of his conclusions to be suspected. In the Phil. Transactions for February, 1671-2, No. 80, page 3079, he assumes that by reason of the different refrangibility of different rays of light "the object glass of any telescope cannot collect all the rays which come from any point of an object so as to make them convene at its focus in less room than in a circular space whose diameter is the 50th part of a diameter of its aperture." But in his New Optics, page 72, he contracts this space to a 5th part of that he had made it in the Transactions, for, says he, "the sensible image of a lurid point is therefore scarce broader than a circle whose diameter is the 250th part of the diameter of the aperture of a good telescope." Cautiously worded, whence in the next page he concludes that in a telescope of 20 or 30 foot, with an aperture of 2 inches, the fixed stars (the only lurid points, as Dr. Gregory would have them) will appear 5 or 6 seconds in diameter. Now this being granted, every the smallest lurid point in the heavens must appear 5 or 6 seconds broad, or lurid points may have bodies so broad bestowed upon them by refrangibility of different rays.

But you and I that have been continually employed in the heavens know very well that more than two-thirds of the vast number of stars or lurid points that we see in them with glasses of 16 or 26 feet are scarce one single second diameter, whereas his theory makes them 5 or 6,

* In 1664 Horrox's researches on the orbits of the planets, and especially on that of the moon, were communicated to the Royal Society by Dr. Wallis. Flamsteed very early perceived the value of the Horroxian suggestions, which he followed up by calculating more enlarged tables of the moon's motion, compared with observation, which formed the basis of his subsequent labours on the lunar theory.

which is therefore false. In fact let him look to the consequences. I foresee them, but need not mention them to one of your skill and experience.

What he says in the next page about destroying the adventitious false rays is to excuse a palpable mistake of Mr. Huygens'. I make the best of it in calling it no worse. Having showed the cause of it in my letter to Mr. Caswell about Dr. Gregory's book (of which I think I gave you a copy formerly), I need say nothing of it here, but if I did not I have one at your service whenever you shall please to command it, which I hope will give you full satisfaction concerning his and Mr. Newton's mistake.

According to Mr. Newton every star in the heavens that has light enough to paint its image in the distant base of a 16 foot telescope must appear at least 5 or 6 seconds over with one inch aperture, or twice as much with an aperture of 2 inches. He ought to show us a reason why some stars, his lurid points, appear not near 1 second diameter, others 6, 8, 10, or 12 seconds, if all are in themselves only lurid points.

Mr. Newton presented me with one of his books on the 25th February last by his bookseller. I returned him my thanks by the same person the next day. I had bought one of them before, which I had by me, cost 12s., bound in quarto. De Moivre's book against Dr. Sheene is also out. The author presented me with one of them, 'tis a small folio at 4s. I have never thought much of that subject, and therefore design that you shall receive it as a present from the author, who is not unknown to you and has a real value for you. With it, if you are not provided of Mr. Newton's Treatise, I would send you that I purchased.

Your real friend and servant,

JOHN FLAMSTEED.

In a subsequent letter Flamsteed continues the subject referred to in his previous letter, namely, the theory of light and colours expounded in Mr. Newton's treatise:—

I thought this morning to ask your opinion of the rays of light, (1) whether the native light that forms the image of the sun, moon, or any star in a telescope be the pure rays transmitted from the sun, moon, or star or not? If you think not, then (2) whether there be not in our air some medium proper for the transmission of native light only? whether there may not be in our air also bodies, or a substance of a different sort that is slower moved, and that the rays of light striking on these may impress motions upon them different from those impressed by native light, and serving thereby to exhibit colours? for (4) 'tis evident that light moves over a radius of the orbis magnus in

ten minutes of time, but sound only about 500 yards in a second, which tho' sufficiently swift is infinitely slower than the motion of light. (5) May there not be a quicker motion impressed on particles or medium that carry sound by the native light than any force we know (that creates noise) can give them? or (6) may there not be in our air some other particles of a middle nature betwixt those that convey light and sound, not so swift as the first nor so slow as the latter, that may serve to represent colours?

I am of opinion that the great Author of Nature has not given us senses subtle enough to apprehend these things in our present state; but when the real man (the soul) shall be rid of his earth he will have a nearer way of approaching them and contemplating the wisdom of the world's Architect and praising Him for it. But in the meantime we ought to prosecute our studies of Nature, and the more knowledge we gain here the greater shall be our happiness hereafter. I am forced to conclude here, but in a short time you may again hear from your obliged friend and servant.

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *May 4th, 1704.*

SIR,

My discourse about the faults of Mr. Newton's Optics and corrections of my lunar numbers brought the subtle gentleman down here the 12th past. I thanked him for his book. He said then he hoped I approved it. I told him loudly "no," for it gave all the fixed stars' bodies of 5 or 6 seconds diameter, whereas four parts in five of them were not 1 second broad. This point would not bear discussion; he dropped it, and told me he came now to see what forwardness I was in. The Books of Observation were shown him, my Catalogue with Tycho's and Hevelius's, as also the chart of the fixed stars. He seemed pleased, and offered to recommend them privately to the Prince, but was told he must do it publicly, as he could for some good reasons, which not being able to answer, he was silent. Plainly, his design was to get the honour of all my pains to himself, as he had done formerly, and to leave me to answer for such faults as should be committed through his management; but having known him formerly, and his sole regard to his own interests, I was careful to give him no encouragement to expect I should give him anything gratis, as I had done formerly. I showed him also my new lunar numbers fitted to his corrections, and how much they erred, at which he seemed surprised, and said "it could not be," but when he found that the errors of the tables were in observations made in 1675, 1676, and 1677, he laid hold on the time, and confessed he had not looked so far back, whereas if

his deductions from the laws of gravitation were just, they would agree equally in all times.

I have caused some of my maps to be done a new design by an able workman. These I also showed him; they are very masterly done, each plate is 24 inches long and 20 broad, and will cost at least £12, all complete, with the engraving and finishing. He seemed not to take much notice of them, whether because he is no great judge of these things, or out of discretion, I may not pretend to judge, though I tell you they will be the glory of the work, and, next the catalogue, the usefulest part of it, if God give me my life to see it perfected, which I cannot fear or doubt He will when I consider how His providence seems to have hitherto protected and taken care of it.

Excuse the long delay of this answer, and believe me your affectionate friend,

JOHN FLAMSTEED.

Extract of Letter from Abraham Sharp to J. Flamsteed.

HORTON, *October 25th, 1704.*

SIR,

Yours of the 21st past, notwithstanding your complaints of want of matter, contained the best and most acceptable that has come to me these many years. The encouragement you now meet with for printing your works is worthy of the Prince, and I hope will not fail you in an undertaking so noble and highly deserving his countenance and cost till it be completed. I am very sorry you have ground to fear the loss of your principal assistant, which at such a juncture is like to be a very great disappointment. Some way, I hope, may be found to prevent or make up the loss. Should be glad if at this distance I could contribute anything to your furtherance. I should as readily undertake any calculation, or what other part of your business I am capable of, you care to entrust to me. If Mr. Hodgson be full of employment, as you intimated, it will be difficult to take him from it. My ignorance of his circumstances, I hope, will excuse my complaining of his seeming though involuntary neglect, but he has made abundant expiation by his letter I received by the same post with yours. It is a great undertaking for one, especially so young a man, to teach all parts of experimental philosophy, and the apparatus or instruments in order thereto which he intimates is now making for him. It will, in my opinion, be too great a charge for a single purse. Surely your Royal Society, or some generous members thereof or others, might contribute to so laudable a work, which seems destined and is likely to be

largely instrumental in reviving that society now, in appearance, sadly drooping and languishing, the products of their consultations and correspondence being of late very inconsiderable.

Your humble servant and friend,

ABM. SHARP.

In December, 1704, Flamsteed writes to Abraham Sharp:—
 “Mr. Ditton, a Nonconformist minister, formerly at Tunbridge, now living in London, is publishing an explication of Mr. Newton’s principles. ’Tis a good piece on mechanics, but has not much extra in it besides the preface, which is the best wrote of any I have seen for a long time, and is a special answer to Mr. Tolard, who contends in his letter that motion is essential to matter, which he ridicules most judiciously. The book is a small octavo, and yet is four shillings in price. If the bookseller have it not, I will send it you, but I send you something better for the micrometer you sent me.” In return, Sharp sends by John Holdsworth, the carrier, another thousand quills and a penknife, observing: “The charge for the quills and penknife is inconsiderable, little exceeding that of the book you sent. The penknife came easier than you suppose. They stand only to twopence halfpenny each, one with another; the flat hafts are the cheaper. I could not be sure to get such at that rate any time on the sudden, but upon notice I may. I hope we can trust one another for greater sums than this amount, which is not worth mentioning.”

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *March 6th, 1705.*

SIR,

Yesterday I was at London with Sir Christopher Wren, Mr. Roberts, Mr. Newton, and some other gentlemen, to view some specimens of a printer’s page of my book of observations. They were ill done, and I am causing them to be copied again in order to have them printed again if the gentlemen think fit.

You were pleased to offer me your kind assistance for calculations.

I shall have an allowance of about £40 per annum each for two calculators, and I think myself obliged to make you the tender of one of them, but I cannot expect you who have much business on your hands to spare your whole time for them. I desire, therefore, that you would consider: first, what spare time you have that you can employ in this business; and, second, how many planets' places you can calculate in a week or the observed distances; third, what reward you expect for your pains, that is, whether I must account with you and pay you so much by the score or hundred, or whether you would have an allowance proportionable to your time, and then I must acquaint you further.

I desire you would calculate them in a book made up in quarto by 3, 4, 5, or 6 sheets as you think fit, which, when 'tis filled by your calculations, you may send me here by the carrier, that whatever you calculate in Yorkshire may be repeated by a calculator here for certainty. We are all so prone to error in calculations of this nature that no single hand is to be relied on, and for the easier discovery of any error either of yours or of my calculator's here, I shall desire you would always follow that sure method that I use, of which I shall send you an example. I shall allow you the charge of postage and paper, and a printed copy of the book when finished. Your answer to this proposal as soon as conveniently can will very much oblige

Your servant and friend,

JOHN FLAMSTEED.

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *April 24, 1705.*

SIR,

Yours of the 23rd past, and am very much obliged for it. This week I hope to have forty sheets of the first volume fair copied for the Press, as also the distances of the superior planets and moon from the fixed stars for the five first years of my residence here, to be sent to you by the carrier then in town,* directed according as you order to Mr. Robt. Stansfield's, at Bradford, without any mention of your name on the direction.

I intend by the same convenience to send you Argoll's Ephemerides

* At the period referred to there were two common carriers who performed the journey between Bradford and London, namely, John Hall and John Holdsworth. John Hall was the more substantial man of the two, and resided at Low Fold, Great Horton. He employed between thirty and forty horses in the carrying trade, which was not confined to the Metropolis. In the graveyard of the Bradford Parish Church may be found an inscription recording his death, which reads as follows:—"John Hall, of Great Horton, London carrier, died March 16, 1725."

and Mr. Cheyne's book, together with a few printed copies of my estimate of the number of pages my works when printed will contain, whereby you will see what you are to expect from me, and may inform your friends that are curious of the same. 'Tis the same paper I drew up for the satisfaction of my friends, and which Mr. Hudson, by God's providence, without my orders delivering it at the Board of the Royal Society, was there read, and occasioned their recommending it to the Prince by the President of the Council, and his taking the charge of the printing the two first volumes and catalogue on himself. The maps of the constellations he has not engaged himself in, but, these being the most sumptuous and usefulest part of the work, I doubt not but they will be taken care of in due time, for I am fully persuaded that the good Providence which has hitherto guided and governed all my endeavours will produce them all to the publick by easy methods in His own good time.

Mr. Newton is knighted, stands for Parliament man at Cambridge, and is going down thither this day or to-morrow in order to his election. 'Tis something doubtful whether he will succeed or no by reason of putting in too late. I expect him back about a fortnight hence, and within a month after we may begin to print my works, if God spare me life and health. I was with him on Saturday last to wish him joy of his honour. He was more than usually gay and cheerful, but well preserved the same temper that I had always found under it, and therefore took care to be no more open than formerly. I dealt plainly and sincerely with him as I used to do, and this keeps me always safe, but I take care to inform him no further of my business than he does me of his or necessity requires, since he makes such use of it when I do as no deserving man would allow. He will see his error in a short time, and be the firmer friend to the Observatory hereafter. I pray God keep you in peace and health, and am

Your affectionate friend and servant,

J. FLAMSTEED.

Extract of Letter from J. Flamsteed to Abraham Sharp.

OBSERVATORY, May 21st, 1705.

SIR,

Some ten years ago Mr. Newton desired me to impart a table of refractions to him which I had derived from my Observations, and then two or three months after sent me a table built on a theory that supposed the upper regions of our air were colder than that part of our atmosphere near the earth, and the refractions, consequently, greater

above and less near the earth, because the rays were bent more back as they approached the earth by reason of the increase of warmth. This I could not allow, because I conceive the refractions of warm water little less than of cold, and the like of warm air ; but what swayed more with me, I considered our air near the earth as a compound of various sorts of vapours, aqueous, saline, and others, that run it much denser near us than at a distance, and hereby concluded that at a small distance (not more than half a-mile from the earth) the rays of light begin to be more bent by it than those that are in the purer upper regions. On this theory I built the table of refractions I sent you, which differs nowhere above a quarter of a minute from his, and answers all my observed refractions as well. You must lay the faults in my copy of it to my haste and spectacles, and correct them as in the margin.

Mr. Godolphin and Sir Isaac Newton are not chosen at Cambridge.* I hope the latter is returned, and that with God's blessing we shall begin to print in a short time, having half the copy of my first part in readiness. There is about sixty sheets transcribed. I pray God continue your health, and am, sir,

Your affectionate friend and servant,

JOHN FLAMSTEED.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, *August 3rd, 1705.*

SIR,

Yours of the 23rd and 25th past I have in answer to two of mine. The first I intended should have found you at the Observatory, but, living near a mile from the town, I cannot always put my letters into the post office myself, although I do it as frequently as I can, but am necessitated sometimes to commit them to the care of my kinsman, R. Stansfield, of whose carefulness and fidelity in other respects I have sufficient experience. But at that time, he being taken up with other urgent business, trusted that and another letter of mine, with some of his own, to the hands of a knavish boy, his apprentice, to put them into the post office, who kept both mine, unknown to his master, out of a villainous curiosity I suppose to open and read them. Of this I suspected nothing until I had sufficient assurance that the letter I sent at the same time to

* The year of the publication of the *Principia* (1687) witnessed the illegal attempt of James II. to interfere with the rights of the University, and called forth the memorable defence of those rights by a deputation, of which Newton was a member. It was his zeal for the rights of the University that led to Sir Isaac's election to sit in the Convention Parliament for the University in the year 1688, and again in 1701.

another person never reached him; but I shall be more cautious for the future.

I received Mr. Lowthorp's "Abridgment of Transactions" in three volumes, for which I return my hearty thanks, so likewise for your kind offer of Mr. Halley's "Synopsis Astronomia," which I have, both single and in the Transactions; and also for your intention to send me his "Quadrature of the Circle," which I had before it was printed and probably it had not seen the light, yet had not I given the greatest encouragement (though contrary to my particular interest) and contributed considerably towards it, both in that I had done it before, to somewhat greater exactness, another way. This I had sent to Mr. Hodgson on his continued importunity, enforced (as he told me) by the pressing solicitations of some of the Royal Society, though 'tis now, I perceive, laid aside and neglected; and also in forming the whole operation for this of Mr. Halley's, with whom I have had no immediate correspondence, only by a second hand, except one letter he sent me containing his demonstration of it, which I answered, not to himself, but by a friend. But in all I writ there has not been the least mention of your name or my concerns with you, of which I am certain he has not had the least intelligence from me. About this I ever have and still design to be most scrupulously cautious. You may be assured of whatever is in my power for the promoting of your interest and business, and that no prejudice (if it be possible to be prevented) shall ever accrue to you from

Sir, your most obliged humble servant,

ABR. SHARP.

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *September 25th, 1705.*

SIR,

I have one favour to beg of you, that you would please to let me know how many of those calculations of the moon or planets' places from two cross distances you commonly dispatch in a day when you are not hindered by other business. It will be no detriment to you and an advantage to me. Pray also let me know what I am in your debt for your obliging assistance in this business, that I may take care to pay you before I engage myself deeper. The calculations hitherto have been very perplexed, troublesome, and so intricate that it was morally impossible to avoid mistakes. I know you to be as expert at numbers and as intent on the work as any man, yet having compared the calculations of the moon's places received with Mr. Witty's, there are sometimes great differences, often small ones none the less difficult to rectify than the larger ones. I forgot before to request you to let me know what charge

I have put you to by post letters or carriage, that I may also repay you.

I am ashamed to be so much in your debt so long. I will leave ten guineas in Mr. Knap's hands within a fortnight, to be returned upon Mr. Stansfield, if you like it. I do not look upon this as a sufficient reward for the pains you have taken on my account, but desire you to accept it as a friendly acknowledgement of my own till I have an allowance that will afford me to make you a better.

Your ever faithful friend,

J. FLAMSTEED.

P.S.—I use not to tell you public news, but having spare room I will now give you some. We were long fearful that the English forces would return from Spain without doing much, but at last news makes us not doubt but that Barcelona is taken. Some say the Spanish nobility begin to come in to King Charles, and we hope a good issue of this expedition.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, *October 1st, 1705.*

SIR,

Yours of the 25th past dissipated the suspicions I was ready to entertain of the miscarriage of mine, which I sent to the post by an unusual messenger. But, as I imagined, the delay has produced an account of your examination of some of my calculations which, though as it proves, cannot be very pleasing, yet it has with some impatience been desired, that I might both know what was amiss and have an opportunity of rectifying it, and by completing the work render the whole serviceable. You know I never pretended to such infallibility as to form a work of this nature, yea, though it were easier, without errors, but on the contrary being sufficiently conscious of my own frailty and propensity to mistakes (of which I have given caution more than once), I never durst suffer anything of consequence to pass out of my hands without a proof, if it was capable thereof, yet it cannot but be a great trouble to understand my errors to be so numerous and great.

I can assure you I have been so far from remitting my care through the tediousness of the work, or, as I fear you may suspect, growing weary of it, that my care and vigilance has been more intense and strict in the later end than it was in the beginning, which was occasioned by my own discovery of several mistakes where I had any suspicions before the papers went out of my hands, as you may see by the several corrections I have made.

Therefore it seems strange that that part of a sheet I sent first should pass without any oversight, since through want of sufficient experience of my own fallibility I used not half the caution therein I saw necessary afterwards, so that hence I see how ineffectual an extraordinary circumspection proves for avoiding errors which I find will be intruding upon me by I know not what inevitable fatality. But fruitless complaints avail nothing. The next important thing is to correct them, and in order thereto to discover them I kept no copy of my calculations, but only of the results, namely, the longitudes and latitudes of the planets and moon deduced therefrom. To transcribe them will be unnecessary labor, but 'twill be absolutely necessary to have those of Mr. Witty's that differ from mine, the rest will be insignificant, and if you please to make some remark upon all of his you see reasonable to believe are true, I shall use my endeavour to make my calculation agree therewith, or give you sufficient proof of the contrary. . . .

I shall be in pain till I be upon the correcting work. I assure you I shall proceed therein with alacrity and vigour, *Deo adjuvante*. Notwithstanding, no consideration can be expected for it, since 'tis of my own procurement. What you will please to allow more for what I have done already shall be wholly referred to yourself, and what you judge proper shall fully satisfy me, having an entire confidence in your ingenuity, of which I have had such ample experience.

For some time at the beginning of my calculations I found six as many as I could dispatch on one day, namely, from six a.m. till six at evening, allowing only a moderate time for refreshment, without any other interruption. Afterward, when the distances from the same stars recurred, sometimes I could master seven. Towards the latter end when they returned often I could perform eight, but never exceeded that number; more frequently, through mistakes and other hindrances, was forced to be content with fewer; and if, as too often happened, I was under some disturbance and trouble of mind, and perplexed with a hurry of disordered thoughts, nothing would go forward, and this no doubt might occasion many mistakes; yet at such times I generally insisted the longer on it, and being jealous of errors, for the most part revised the work, and never suffered any that I could detect, though never so inconsiderable, to pass without correction.

The charge of post letters, &c., is a matter of little moment. The smaller books you have sent me are of greater value, but what need of so speedy and strict a reckoning? I neither do nor can reasonably expect any payment from you till you receive from the Prince what is intended for that purpose. I hope our correspondence is not yet so near a period, and that you will not withdraw your favor for involuntary miscarriages, especially seeing I am ready and with impatience wait for an opportunity to make sufficient reparation if possible, with the resolution not to expect the least allowance for the time and labor expended therein. I only desire these things if the trouble be not too great:—1st. That where

there is a disagreement between mine and Mr. Witty's calculations, the same semi-diameters of the moon he uses may be transcribed and sent me, that I may make the central distances the same with his, since I cannot confide in these erroneous tables of Argol's, wherein I have detected several considerable faults. 2nd. That the longitude and latitude of the moon and planets deduced from his calculations, where his and mine differ, be sent. 3rd. That when my computed distances of the stars and the angles, being the result of the first part, and your calculations are different from what he makes them, his may be communicated, which would be a great help in detecting the mistakes.

I am sorry you meet with so many rubs in the prosecution of your business. I hope all will be cleared in a little time. Printing the Catalogue without maps and constellations is to render the work lame and imperfect, and unworthy of so great and generous a contributor. Since Hevelius is so well furnished, which probably were done at private charge, it shews how little a genius Sir Isaac Newton has for such pieces of art, since, as before hinted, he looked but slightly on your finest drafts, which will no doubt be as great an ornament and recommendation of the work as anything imaginable, and I cannot conceive how they can be sufficiently intelligible without there being many stars in your Catalogue which never appeared in any before. My regards for your welfare are as great as ever, and that you may continue your health is the wish of

Your humble servant and friend,

ABM. SHARP.

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *November 20th, 1705.*

SIR,

I doubt not but on the sight of the bill enclosed, your kinsman, Mr. Stansfield, will pay you the ten guineas he has received of me for your use. Pray when you have received them let me know it, for I shall be in some concern till I hear this bill is come safe to your hands and paid.

Sir Isaac Newton has at last forced me to enter into articles for printing my works with a bookseller very disadvantageously to myself, but 'tis not time yet to tell you the story of his scheming. I shall hereafter, and how much he has thereby injured me, and I see not that we are nearer the Press than before. As soon as we make a real beginning you may expect more work and to hear further from me.

Your real friend and servant,

JOHN FLAMSTEED.

In reply to the offers of assistance which Mr. Sharp had previously made to him, and in answer to an inquiry as to how his affairs were proceeding, Flamsteed writes the following letter :—

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *March 2nd, 1706.*

SIR,

You desire to hear how my works go on. I shall give you a brief account.

In November last I delivered in 100 sheets of copy. About a month ago Sir Isaac desired to see my first notes, and I sent the first book of them. This day se'nnight Mr. Hodgson told me he had been with Sir Isaac and had seen 4 or 5 folio pages of differences he had noted between the original and copy I sent him last Monday, and desired to see them. He told me Dr. Gregory had collected them. The doctor soon came, when we sat down to examine them. Sir Isaac told me he did not believe them to be errors, but desired that himself and the doctor might be informed of my ways of observing. They were proper judges. In the meantime I ordered James to come to me, for I have resolved not to talk with them without good witnesses. He came in good time, we set to work, and found a great many differences, but all of the doctor's making. He had formed a table for turning the revolves and parts into degrees, minutes, and seconds, and supposing the threads of the screw everywhere equal, wondered that his equivalent degrees, minutes, and seconds agreed not with mine. I told them I wondered he should adventure to make this table, wiped out his emendations from my margin, engaged to give them an account of the other differences, dined with them, and returned home next day. I caused my own large table to be copyed, and the day following sent it to them with the rest of my first notes to September, 1689, to be compared, and now I expect to hear by Wednesday what will be done. I told them I had been at great expense in the work and expected a recompense, but I fear Sir Isaac Newton had rather stop it than give himself any further trouble, for he finds I do not court him, and his temper wants to be cried up and flattered.

I have always hated all such low practices, but have learned that care that I have not afforded him any opportunity to recede. He thrust himself into the business purposely to be revenged of me because I found fault both with his Opticks and corrections of my lunar numbers, and would not suffer him to recommend my works privately to the Prince when he desired it about two years ago. However, I take no notice of this, but carry on as if I thought he only wanted better information, and take care to oblige him with enough of it. . . . Sir Isaac

carries himself very cunningly. I deal plainly and sincerely with him and doubt not but God will let me see a good effect of it.

Your obliged friend and servant,

JOHN FLAMSTEED.

In reply to the last communication and in acknowledging the information supplied him, Mr. Sharp speedily forwarded the following :—

Extract of Letter from Abraham Sharp to J. Flamsteed.

HORTON, *March 9, 1706.*

SIR,

. I am not a little troubled at the account you gave me of your own proceedings. It is too manifest Sir Isaac Newton has no honest designs in his concerning himself so much with your business, and his confederacy with Dr. Gregory (who, it is probable, is upon the like reason equally prejudiced) renders the matter still more suspicious. They would never have put themselves to so much trouble in examining your works had they not been carrying on a sinister design to your disadvantage. I am heartily sorry you have fallen into such hands, who, instead of promoting, will in all probability use their utmost endeavours to obstruct your efforts. After this, indeed, I don't expect your printing should proceed with any vigour as long as it continues under the superintendence of Sir Isaac. I hope providence will in a short time extricate you and direct you to such methods as may be advantageous and successful. I had hoped Sir Christopher Wren would have appeared more for you, of whose integrity you have better assurance.

Your friend and humble servant,

ABM. SHARP.

In an epistle to Flamsteed, written on receipt of the above, Sharp says :—"What you offer me exceeds my expectations, namely, the ten guineas you propose to pay into Mr. Knap's hands. I can assure you I should never have desired anything of that nature had it not been more for the satisfaction of some of my friends here, who are ready enough to censure me for employing so much time in matters which they are apt to account trivial and unprofitable. 'Tis only by such a

sensible argument as this that their mouths can be effectually closed."

The following letters, transmitted by the respective correspondents, mostly treat of an old-world philosophy on astronomical and meteorological subjects, upon which comment at the present day would be superfluous. Running through the correspondence will be found numerous comments on the unsatisfactory relations existing between Flamsteed and the committee appointed to superintend his work.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, May 28th, 1706.

SIR,

I have lately sustained a much more considerable loss than that hinted at in my last, viz., your mathematical friend, or rather patron, Mr. Kirke,* whom I suppose you knew, having been many years a Fellow of the Royal Society and frequently at London, where he was when his last sickness seized him the beginning of last winter, and after he got home continued languishing till the latter end of April. Yet of this I had no certain information till the news came of his funeral, by reason of the distance and difficulty of obtaining intelligence from thence. The loss is public, he being a Justice of the Peace, and very much esteemed. My share therein is not the least. He always manifested a singular respect for me. He had a considerable collection of very valuable books, mathematical, historical, and philosophical, several curious instruments, and a variety of other rareities, all which are now like to be dispersed, he having left one son but young and of shallow capacity, and by report now dead.

I have no leisure to make any further progress in the tables of *prostaphæreses*, neither shall I till another month hence, that I have got my hands quit of the troublesome business wherein I am unavoidably though much against my inclination engaged, which I find will usurp a

* Mr. Kirke resided at a place called Cookridge, about ten miles distance from Horton and about four miles from Leeds. "Cookridge," says Thoresby, "is deservedly famous for the noble and pleasant walks that Mr. Kirke has contrived in his wood there; an avenue of four rows of trees leads from his house to that most surprising labyrinth which at once delighteth and amusethe the spectator with the windings and variously intermixed walks, which are so intricate that those who are engaged in them cannot without some difficulty extricate themselves, there being no less than sixty-five centres and above 300 views, the whole containing about six score acres. The double line walks are about twenty foot wide and the single about eight, and all kept in excellent order by that ingenious gentleman who has the pleasure, or fatigue shall I say, of almost all foreigners and gentlemen of curiosity of our own nation that travel into the North." After the decease of Mr. Kirke, Cookridge Hall was purchased by Sheffield, Duke of Buckingham, and afterwards passed to the collateral line of Sir John Sheffield.

larger share of my thoughts and time than I can well spare. However, what vacant hours I have shall be improved therein, or anything that I know may contribute to your advantage.

It is a very great satisfaction to hear that the Press proceeds in your business. I hope you are met with no further obstruction. I shall be mightily pleased to hear that you had got an allowance for printing your maps of the fixed stars. It will be a great disappointment and loss if, after all the pains and costs you have been at in drawing them, they be at last cast aside. I hope, however, Sir Isaac Newton may be brought to a better temper and no longer oppose it, since the charge to the Prince will not be considerable if compared with the credit and honour that will result from such a work. I hope all will be carried on successfully if your health be continued, which I heartily wish,

And remain your humble servant and friend,

ABM. SHARP.

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *March 2nd, 1708.*

SIR,

When I tell you that I had yours of January 8th in good time, I may seem to you to accuse myself of sloth and neglect in having so long forbore to return you an answer. I must therefore tell you what I have often suggested—that there is no one I more desire to oblige than yourself, and from whom I more gladly receive letters, but I am ashamed to return answers filled only with compliments on common things, and therefore am forced to forbear writing that I may not trouble you with impertinences, which, rather than appear disrespectful, I fear I must do at this time.

I thank you for your account of the lunar rainbow. Such appearances are very rare, and I never yet met with any account of them so well circumstanced as yours. They are sometimes mentioned by historians as prodigies. Camden gives an account of one seen by himself in the reign of Queen Elizabeth, and other historians sometimes mention them, but not often. The reason is plain; because, although there may be matter enough in the air to form them as often as those in the sun, yet (except at or near the full moons) I reckon she neither affords rays enow, nor are they moved directly enough, or so strongly, as to form a vivid representation. You say the colors in the bow you saw were faint. The solar rainbow viewed with a two-foot glass appears fainter—as I remember—than to the naked eye. I wish you had viewed this with such a glass, to see whether the colors were not more vivid.

Your thoughts concerning the restitution of the planets' motions are

just. They act one on another, and since their actions are as the squares of their distances reciprocally, it will be difficult, and require a great deal of consideration, to disentangle them, and find what the effects of their actions have been in several ages, for certainly they must cause secular inequalities in the superiors. And though the inferiors, being less in bulk, cannot have so great effect on each other, yet approaching each other much nearer, their effects must be sensible and perplexed. I think I feel them both in Mars and Venus, and then our earth that moves betwixt them must be involved with the same.

And for Jupiter's satellites I doubt not their motions are all liable to inequalities, but my age and infirmities suffer me not to examine them as I would. All I can do is to lay in a stock of observations—as I have done—for the primary planets, whereby posterity may be enabled to proceed where I am forced to leave off through the envy of ill men, lest I should impoverish my nearest relations, whom I am bound for justice and conscience to take care of, since they are in no capacity to provide for themselves.

I have now the oppositions of thirty-two years or more—through God's blessing—carefully and exactly observed, which is a blessing that never was granted by Him to any of my profession before me. I have a catalogue of the fixed stars four times as large as Tycho's, and twice as numerous as Hevelius. I think I may now be allowed to sit down and prayse the wise Creator of the heavens for his favours to me, and leave those who have more strength and health to devise further prayses to him from the results of my labours, and though the progress of the Press be stopt at present, yet I doubt not it will goe on agane in a short time till all be published; but if I must be used as I have been, and my works not more carefully printed, it will be best to stay where we are till God remove the envious, and send us more sincere and honest persons to deal with and manage it.

Your affectionate friend,

JOHN FLAMSTEED.

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *February 11th, 1709.*

SIR,

Yours of the 6th past found me busy in considering the motions of the planet Saturn, his opposition to the sun. I had observed him the last days of December. Mr. Bessley, whom I have sometime mentioned to you as employed by me, wrote me a letter at the same time, wherein he told me that his former attempts to represent my

observations of this planet's motions having failed, he had made a new, and sent me the result of his determination, which I have since examined, and find them not sufficient. The French having endeavoured to do the like it gave me occasion to examine theirs, which I find worse than his.

It was not till yesterday that I determined what was to be done in the business, but I am not yet fully resolved, only thus much, I think I foresee that I shall be able to answer all the good observations of the last 200 years within 6 or 7 minutes, and the old one that was made about 2000 years ago tolerably well, and thus much I dare assert from my work—

1. That the Aphelion of Saturn moves much swifter forward than it has usually been thought interfixas.
2. The node recedes interfixas.
3. The greatest equations are not much different from Kepler's.
4. The inclination of his orbit about $1\frac{1}{2}$ minute less than he or Bullialdus makes it.

I hope next week to get new tables ready for my calculators to compute his places by and make a more exact correction. I must add more ; that his mean motion is much slower than Kepler and Bullialdus make it.

As soon as I have done with this planet I intend to proceed to Jupiter, for whom I have some tables also, made formerly by Mr. Bessley, which will be useful to me. . . . I shall not be very easy till I get the planets' motions off my hands, and perhaps I may at the same time fall on Jupiter's, who, I hope, will not give me so much trouble, but whom I shall more desire to bring to rule because the motions of his satellites require the true knowledge of him

I must add concerning Saturn that, whereas Sir Isaac Newton suggested to me that all the planets increased in their bulk continually by an accession of matter from the tails of comets passing near them, and resolution of matter from the æther about them, this now seems not probable. Mr. Halley had told him that the motions of Saturn were slower this last 100 years much than formerly. I have tables of Saturn by me of his making, presented to Sir Jonas Moor, wherein he makes Saturn's motion in 100 years 26 minutes slower than 'tis in the Caroline tables. Now, if the planets grow slower in their motions they must consequently remove further from the sun, and there is no reason for their removing further from the sun except they increase in bulk and weight ; but I do not find that Saturn moves any slower now than he did almost 2000 years ago, which makes me think our earth and the other planets have gained little or nothing from the tails of comets, and that the fumes from them have filled our orbit from the sun as far as the orb of Venus with that matter which causes the light we see in

the moonless nights about the time of the vernal equinox, of which Mr. Ffatio has given an account.

Whilst I have been upon Saturn I have found a period that may be of very good use to our ephemeridists. 'Tis 206 years precise ; after which he returns to the same place, very near, in the ecliptick, at the same distance from the sun. A period of 83 years reduces Jupiter nearly in like manner.

My knees and ankles grow very weak, so that I cannot get into the stage coach without help when I go to London.

Your friend to serve,

JOHN FLAMSTEED.

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *March 24, 1709.*

SIR,

And now I bless God for it I have all things in good readiness for the edition of my works, and I commit all to the ordering of His providence ; but since Sir Isaac Newton has put a full stop to the Press shall not urge it forward again until I see a good fund settled and some one to carry it on without any danger of impediment or obstruction from him or any of his tools.

I suppose you have heard that Dr. Gregory is dead. Mr. Casswell, my friend, is chosen to succeed him in the astronomy professorship at Oxford. Mr. Keile put in for it. Mr. Halley did all he could to serve him, that he might marry his daughter, but his vile character caused some sober persons concerned to urge Mr. Casswell to accept it, who resigned his place worth more than £200 per annum for this worth about £120. The good man thinks this enough for him, and is well enough pleased with his change, and I think him very wise in what he has done.

Mr. Newton, the mathematical master at Christ's Hospital, has resigned—that is, turned out for insufficiency—and James Hodgson succeeds him, and has been in that office ever since Christmas, and I hope will discharge his duty faithfully as he should. I am sure he wants no endowments.

I am sorry to hear that you have not your health this winter. I have enjoyed mine better than formerly by reason that I keep more within doors, and do not expose myself to the cold so frequently as formerly. I praise God for this, and would advise you as your years advance abate your diet, avoid cold, use moderate exercise, and you will find through His blessing better effects of it than you can expect from

physic. I write this letter to let you see I am very mindful of you, and ready to remember you on every occasion. I shall be glad to hear of your health, which I pray God long to continue to you,

And am, Sir, your real friend and servant,

JOHN FLAMSTEED.

Extract of Letter from Abraham Sharp to J. Flamsteed.

HORTON, *April 12th, 1709.*

SIR,

. The solar eclipse of February 28th I never so much as looked for; since Parker mentioned it not visible at London I had not the least hope of seeing it here, and indeed I want my usual monitor, the least hint from whom would have engaged me to look after it. But the truth is, the weakness of my eyes, which for some considerable time have been very sore, the disorder in my head, which I intimated formerly, for which I find yet very little relief, do render me extremely indisposed and unfit for observations; besides the extreme severity of the weather continuing to near the beginning of this month, and the inability of my declining body to endure the cold as formerly.

I have in some measure, and do intend for the future, more strictly to observe the rules you prescribe as to moderate diet and exercise, and especially in avoiding colds, which I find and doubt not by the Divine blessing will prove more effectual for maintaining health than physic, to which I have a strong aversion, and have never used but in cases of absolute necessity.

I am very glad to hear that Mr. James Hodgson has got so advantageous a settlement as mathematical master of Christ's Hospital, though I had thought a married person had been excepted, yet question not but your patronage and inspection will confirm him and render him successful therein. When Mr. Newton's predecessor resigned I was strongly solicited by Mr. Halley, Mr. Raphson, and some other of my London friends now gone, to put in for it,* but I had no inclination for so laborious a confinement, being better pleased with an easier though less advantageous employment. Though I understand nothing of the post wherein Mr. Casswell has hereto been placed, it seems in my apprehension far less honourable—at least, less observable—than that which he has now accepted, though it be less perpetual, since here he has opportunities of rendering his abilities more conspicuous and much

* See Dr. Halley's letter to Mr. Sharp on page 25.

more useful to the world, and not lie buried in obscurity as they have hitherto in a great measure been.

I am sorry to hear that Sir Isaac Newton has stopped the Press, yet it is as was allways apprehended would be the result of the Prince's death. Though this delay the publishing of your works, yet it gives you the more leisure for perfecting them, but may I now not hope to see the remainder of your first volume, of which I have only to the 100th page? You told me in a former letter the sheet wanted little or nothing considerable of being complete. However that be, the sight and possession of a complete volume would be above all things most acceptable to,

Sir, your most endeared friend and humble servant,

ABRA. SHARP.

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *December 1, 1709.*

SIR,

I am heartily glad to find by yours of the 4th past that you have received the remaining printed sheets of my envied *Historia Caelestis*. I was much concerned that I could not send them sooner, nor easy till I had put them into Mr. Stansfield's hands, to prevent another miscarriage. You are often concerned in them, but much more in what remains. Besides, you have had so great a share in them by making the mural arc, and calculating the planets' places from the observations made with the sextant and it, that I can never forget to serve you when it lies in my power, nor in the least neglect you. You deal hardly with me when you write that I declare you shall hear seldom from me, for I desire to hear often from you, but am loath to put you to the expense of answers to yours when mine shall bring you nothing that is worth the postage. Assure yourself I rejoice both when I have a letter from you, or meet with anything that may furnish me with matter for one to you. . . . I am now setting one Mr. Ryley, a very ingenious young man that lives in Greenwich, and is ready at numbers, to calculate the moon's visible places from my new tables to the first 100 observed. The true places have been already calculated by the tables by Mr. Witty and Woolferman. My present servant, Joseph Crosthwaite, a Cumberland youth, is to repeat Ryley's calculations, or rather, work against him, for I do not use to let him see another's calculations till he has finished his own, to be sure of his work. . . . When this is done we shall see very easily how near the tables agree with the heavens, and whether the new inequalities

introduced into the lunar system are mine or not, and, probably, what further emendations are to be applied.

I have by me a nonagesimary table, calculated by you, which supposes the latitude (of Greenwich Observatory) $51^{\circ} 28' 10''$ as I used it when you lived with me. I have since determined it better, viz., $51^{\circ} 28' 30''$. It will cost me some little labour to correct the table for this alteration; for use it may stand as it is, but I must make it, however, fit this alteration. I shall give you a small table for the correction when I have finished it, and if you think fit and can take pleasure in comparing the tables with your observations, I shall pick out another 100 to find you employment at your spare hours.

Yours, &c.,

JOHN FLAMSTEED.

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *January 23rd, 1710.*

SIR,

On December 15th last I received a letter from the Secretary of State that signifies to me that it was Her Majesty's pleasure (for the improvement of Astronomy) to appoint a President, Vice-president, and such others as the Council of the Royal Society should think fit, to be the constant visitors of the Observatory; that they see Her Majesty's instruments repaired, and purchase those that were wanted; and that I should give them an account of what observations I made, and make such as they appointed. A like letter was sent to the Office of the Ordnance, and one to the Royal Society. It happens very unluckily for the procurer of those letters (you know who he is), that all the instruments in the Observatory were either absolutely given to me (and not to the Observatory) by Sir Jonas Moor, or else built at my own expense and charge, and I have neither any need or desire to sell them, so that part of the letter falls. As for the other, Dr. H. Sloane is the sole Vice-president. The Council, I am apt to think, consists of persons not less ingenious than he, so that I am in little pain about this visitation, but to obviate the inconvenience that might arise from this letter God has raised me some friends that I hope will give the Queen a true state both of the Royal Observatory and the Royal Society, and doubt not but in a little time the latter and its President and Vice-president will be ashamed of their attempt.

Yours &c.,

JOHN FLAMSTEED.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, March 8, 1710.

SIR,

I am very sorry to hear your old friend is still attempting to undermine you and embarrass your affairs — at least create as much trouble as lies in his power. 'Tis but too apparent he has a design if possible to get you turned over into his hands, that he may have you at command and impose what trouble he thinks fit upon you, which no doubt if his designs be accomplished will not be a little. I am apt to imagine he is carrying on a design to make you sit uneasy in the Observatory, and if possible, to forsake it, that he may substitute some other whom possibly he may have in view for the place. But I hope all his malicious contrivances will be prevented, tho' I am much concerned to find that he has so much influence upon the Court. 'Tis not to be doubted he has calumniated and misrepresented yourself and the management of the business committed to your trust, and magnified his own supposed better abilities. But I hope none of his undermining acts will have effect. 'Tis very much to my satisfaction to find you have some friends at Court who will set matters in a true light and give a just representation of what concerns both you and them who are proposed as your visitors or superintendents. Meanwhile

I remain your humble servant and friend,

ABRA. SHARP.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, July 12th, 1710.

SIR,

It is now not much short of half a-year since I sent my answer to your last; whether or not it reached your hands remains to me an uncertainty, consequently know not whether myself may not stand charged with ye occasion of this tedious and unwelcome silence (which this, I hope, will sufficiently clear me of), but at whose door to lay it at is like to remain a mystery till you please to unravel it.

I can hardly conceive that the rectifying Jupiter's moons (which in your last you desired might stand for a plea) could have been made so long a diversion, since that of Saturn, which you looked upon as more intricate and troublesome, detained you not a fourth part of this time. I rather fear some sadder occasion which I am loath to entertain the thoughts of, but cannot restrain them from encroaching upon me too

frequently ; but till my fears be dissipated could not with any attention apply myself to the calculating of the eclipses of Jupiter's satellites, having waited yet thus long in the hope of receiving from you the rectified tables or places of Jupiter whereby they might be rendered more correct ; but my hopes are now almost dwindled into despair. If I cannot have some assurance that my labour herein will contribute something to your own ease or gratification, I cannot look upon myself as in the least concerned for the pleasing or benefiting any other.

An additional confirmation and augmentation of my fears proceeds from a late irretrievable loss I have sustained of a most dear, kind, and loving sister,* upon whose invitation I first removed out of the south to this place, and with whom I have here resided to our mutual benefit and satisfaction. Now I am left the only remaining branch of the family that retains the name, the rest being all worn out. Although no temporal disadvantage but the contrary is yet in view, yet I am like to be unsettled and solitary, and my circumstances must needs undergo a considerable alteration, but whether for better or worse cannot yet be certainly determined. Being now left destitute of my most desirable worldly comforts, I would gladly still, if possible, retain your correspondence, it being what has ever afforded me as great satisfaction as any earthly thing, for cultivating whereof I have little to offer.

On the 8th May last a strange and unusual phenomenon was observed here, and as I am informed throughout Yorkshire ; whether it might extend further I know not. About a little before 10^h in the evening a meteor, like a round ball of fire, was seen to move very swiftly from east to west, parallel to the horizon, crossing the north part of the meridian under the pole, ascending near or about 15^d when upon it, then appearing much larger than any of the planets, the light proceeding from it equal to that of the full moon or rather clearer as some affirmed. It continued in view scarce two minutes, the motion was so excessive swift ; being so considerable a height it could not but be visible in the southern parts of the kingdom if clouds did not interpose.

I missed the sight of it, being in my chamber, which had no light northward, only I saw like a flash of lightning, but before I could open the casement it was finished. Possibly you may have had a better account of it from other parts which I should be very glad to participate in, or whatever else occurs to your notice which you think meet to impart will lay a further obligation upon, sir, your most assured friend and humble servant,

ABRA. SHARP.

P.S.—The bearer hereof, my nephew (Robert Stansfield), proposes to be in London on Tuesday the 18th inst., and will stay about 8 or 10 days at most, and may be heard of during that time at Mr. Knapp's, in Basinghall Street.

* Mrs. Faith Sharp, relict of the Rev. Thomas Sharp, M.A.

*Letter from J. Flamsteed to Abraham Sharp.*THE OBSERVATORY, *September 20th, 1710.*

SIR,

I have not finished Saturn yet [referring to a previous communication, dated February 11, 1709-10], nor can I well till I see how his places will be represented by my new numbers five or six years hence. I must expect the same for Jupiter. I cannot bring my numbers nearer on Mars than within 5 or 6 minutes of my own observation, though they will agree better, I think, with Tycho's, but then I cannot think his exact to nearer than within that quantity. On the whole I plainly perceive there is a cause that vibrates their motions, and it seems to be their mutual gravitations on each other and pretty regular, so that I do not doubt but to solve them, for their gravitations being reciprocally as the squares of their intermutual distances and directly as the bulk of their bodies, it will not be difficult to determine how much they draw the remotest planet towards the sun, or force the nearer from him. Now, their distances being as the cube roots of their revolutions squared, it will be found how much their revolutions are accelerated or retarded, and, consequently, how much they move swifter or slower on their course. Carry on the thought and you will see that the place of the aphelion will be altered by the same cause, but to find in what proportion will require much thought and pains. I only find it is so in Mars, and to represent two observations made at his oppositions to the sun but four years' distance (and abundantly confirmed by others taken both before and after them), it will be requisite to alter the place of his aphelion near half a degree, whereas the mean motion will alter it but about four minutes in that time. This is the consequence of Kepler's doctrine of magnetical fibres, improved by Sir Christopher Wren, and prosecuted by Sir I. Newton, though I think I can lay some claim to a part of it, for I asserted it in a letter I wrote to Mr. Crompton, of Cambridge, about the great comets in February, 1680-1. You lived with me in 1684 and 5, and I hope took a copy of it, which, if you did, you will exceedingly oblige me by letting me know it, and sending me a transcript of it and the figure, for though I inserted the sum of that letter into my lectures at Gresham College,* which I have by me, yet I am very desirous to get a copy of that letter, because I have two letters of a friend in my hands that relate mostly to it. You need not copy the figures of the comet's path, for I have kept that.

My man, Joseph Crosthwaite, gives you his service, commends the ink, and begs the receipt of making it.

* The meetings of the Royal Society were at first held at Gresham College, and they continued so till the purchase of the house in Crane Court, in 1711, to which they were then transferred, and there continued till about the year 1780, when apartments were assigned them in Somerset House.

Dr. Sloane quarrels with Dr. Woodward continually, and is now for buying a house (of £2000 price) to remove the Society to, in Crown Court, in Fleet. The President joyns with Sloane, and 'tis thought will prevayle, which will blow them up. I hear of all their transactions and meddle not, and I pray God keep you out of the hand of such people as the President, and those that sway him.

Your real friend and servant,

JOHN FLAMSTEED.

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, May 15th, 1711.

SIR,

On March 14 last I received a letter from Dr. Arbuthnot, one of the Queen's physicians, signifying that a copy of my catalogue—which had been delivered into Sir Isaac Newton's hands, and sealed up—was now in the doctor's, who desired that I should give him four constellations that were wanting in it, with the variations, &c., for the rest, for when the part of the catalogue was put into Sir Isaac Newton's hands on March 15th, 1705, these constellations were not begun, and the rest imperfect, which Sir Isaac knew very well. He still persisted to have the copy of it in his hands, sealed up, that, he said, he might have all things in his power. He would not suffer any of my sheets to be printed until he had gained his point, and I was forced to yield it that he might not pretend to say that the Prince would have printed my works, but I hindered it myself.

How the press went on, and Sir I. N. hindered its progress, and continually shuffles and tricks, you have been informed formerly. I shall only tell you now that the press had wrought off ninety-eight sheets of the first volume on October 21, 1707, that we met on March 20, 1707-8, and then Sir Isaac *had* opened the catalogue, and desired me to insert the magnitudes of the stars to those places, for they had not always been inserted in it, and of the £173 I had disbursed ordered £125 to be paid me, which with some trouble I got some time after.

But at the same time he got a second and more complete copy of the ecliptical constellations then showed him into his hands, and which Dr. Halley returned but the six latter figures into Mr. Hodgson's hands about a month ago. The other half is lost, or Dr. Halley detains it with Dr. Arbuthnot's privy, for they are both of one church.

On March the 25th last I was informed by a friend that my catalogue was in the press, and some sheets of it printed off. On the 29th I met Dr. Arbuthnot at Garraway's, who affirmed there was not a sheet

printed, but on April the 2nd I got the first printed sheet, and soon after the three, wherein I found that many of the names I used, which were translated from Ptolemy, and the same in some into the Arab translations of Gauricus, Copernicus, Clavius, Tycho Brahe, Kepler, Bullialdus, and Hevelius, were altered, some names made nonsense, some stars omitted, and others inserted in improper places, and I learnt further that Dr. Halley looks after the press, and was the author of all this confusion. Till I knew this I was willing to have filled up the copy of the catalogue, but perceiving hereby that Halley was minding to spoil the work, and with more views than one, I sent Dr. Arbuthnot an account of his villainous outrage, and desired he would permit me to print my own catalogue at my own charge.

Immediately hereupon I sent my servant to copy the catalogue anew, and got about ten sheets transcribed to lie ready, but, upon a review, found it necessary to copy them out again, which will be done within ten days, and will have a many stars inserted that were not observed when the first imperfect copy was made, and the Hevelian constellations added.

. . . . This action of Halley's has exposed him to all the town, and they forbear not to say he is an impudent f—— and k——. Sir Is. turns off H.'s blame cunningly on Arbuthnot, and Halley is very willing to take it all on himself to oblige his master, who made him fifteen years ago controller of the Mint at Chester, but every one sees his craft, and loathes him for it.

It will cost me near £100 to print only my catalogue and preface, but I thank God he has given it me, and I shall not grudge to employ it in this business, for His glory, and my country's service.

Ever your friend to serve you,

JOHN FLAMSTEED.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, May 26th, 1711.

SIR,

Your obliging letter of the 15th inst. found me under some disconsolate apprehensions, by reason of the long delay of your answer to my last; consequently it was more surprisingly acceptable, especially considering its principal scope and result in the assurance I received thereby of the printing of some more of your works, particularly that part which is most desirable and useful [namely, the catalogue of the fixed stars], of obtaining which I was even reduced to the very brink of

despair, though some circumstances you mention do, however, much moderate the satisfaction, since I can by no means wish your detriment thereby, but must needs conclude some disadvantage and loss is more eligible than a perpetual vexation, which their being exposed to public view, maimed, imperfect, and confused, must necessarily occasion.

Who this Dr. Arbuthnot should be, what his qualifications are, and why your tables should be intrusted in his hands, I do not understand, but am prone to imagine it is but a colour that Sir Isaac Newton rather might put them into the hands of Dr. Halley (though this be the first notice I have had of his being commenced Dr.), whom he might reasonably judge a more proper person for the management of such an affair, and that Dr. Arbuthnot is only employed by him to transact the business with you, being sensible you have less occasion to be prejudiced against him than himself. However, I can scarce persuade myself that Dr. Halley, in thus precipitously putting your tables into the press without consulting you (whose approbation or consent thereto he could not with any colour of reason expect), had so much a design to injure you as to benefit himself or gratify some others who might put him upon it.

No doubt Sir Isaac Newton, being so much his friend as to deposit such a trust in his hands, would contribute largely if not wholly to the charge, or possibly there might be a design at the bottom to render you more free and willing to have them published, or to take it upon yourself. But whatever views they might have therein, the result, I hope, will be very much for the public benefit, which I don't at all question but you will look upon as a considerable alleviation of, if not a compensation for, your excessive trouble and charge. I am only sorry that at the distance I am from you I can contribute nothing to your assistance farther than my hearty wishes. Were it in my power I could take a great deal of pleasure in serving you on this occasion; however, what I can do to the furtherance shall not be awanting.

You mention nothing of what was the subject of your former letter—your being made accountable to the Royal Society. I hope that trouble is over, or the matter so concluded as that no inconvenience may accrue to you thereby.

I am very sorry to hear of your indisposition through feebleness and lameness, of which I have but too apparent a confirmation in your last letter, if it was not the effect of the badness of your pen. Your ink, I perceive, is new; if your man has made trial of my receipt I hope in time he will find it improve better with age. That you may enjoy a confirmed state of perfect health and strength, and ability for success in your present and all your undertakings, is the hearty desire and prayer of,

Sir, your most obliged friend and humble servant,

ABRA. SHARP.

*Letter from J. Flamsteed to Abraham Sharp.*THE OBSERVATORY, *December 22nd, 1711.*

SIR,

I have had another contest with the President of the Royal Society, who had formed a plot to make my instruments theirs, and sent for me to a meeting of the committee where only himself, two physicians, Dr. Sloane, and another, as little skilful as himself, were present. The President raised himself into a great heat and very indecent passion. I resolved beforehand his knavish talk should not move me; showed him that all the instruments in the Observatory were my own, the mural arc and voluble quadrant having been made at my own charge, the rest purchased with my own money, except the sextant and two clocks, which were given me by Sir Jonas Moor, with Mr. Townley's micrometer, his gift some years before I came to Greenwich. This nettled him, for he had got a letter from the Secretary of State for the Royal Society to be visitors of the Observatory, and he said "As good have no Observatory as no instruments." I complained then of my catalogue being printed by Raymer without my knowledge, and that I was robbed of the fruits of my labours. At this he fired, and called me all the ill names, "puppy," &c., that he could think of. All I returned was, I put him in mind of his passion, desired him to govern it, and keep his temper. This but made him rage worse, and he told me how much I had received from the Government in the thirty-six years I had served. I asked what he had done for the £500 per annum that he had received ever since he settled in London. This made him calmer, but finding him going to burst out again I told him my catalogue, half finished, was delivered into his hands on his own request, sealed up. He could not deny it, but said Dr. Arbuthnot had procured the Queen's order for opening it. This I am persuaded was false, or it was got after it had been opened. I said nothing to him in return, but with a little more spirit than I had hitherto shown told them that God (who was seldom spoke of with due reverence in that meeting) had hitherto prospered all my labours, and, I doubted not, would do so to a happy conclusion. Took my leave and left them.

Dr. Sloane had said nothing all this while; the other doctor told me I was proud, and had insulted the President, and ran into the same passion as the President. At my going out I called to Dr. Sloane, told him he had behaved himself civilly, and thanked him for it. I saw Raymer after, drank a dish of coffee with him, and told him still calmly of the villainy of his conduct, and called it blockish. Since then they let me be quiet, but how long they will do so I know not, nor am I solicitous; but I trouble you with a tedious relation, and am,

Yours, &c.,

JOHN FLAMSTEED.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, *August 1st, 1713.*

SIR,

Your kind letter of the 16th past has dispelled all my fears, and given good encouragement to hope for the sensible accomplishment of your laudable designs, which I perceive are still progressing with as much vigour as your circumstances will permit. If you have succeeded so well in the superior planets as you are pleased to intimate, you have made greater progress in your business than I apprehended, and have made a large step towards perfecting all that you have undertaken, wherein others, notwithstanding all the specious pretences and loud boasts, have miscarried or failed. If you meet with but the smallest success in the moon, which I look upon as your most difficult province, the greatest and most arduous part of your work will be in a good measure dispatched.

However, there is already sufficient to silence the unreasonable clamour of querulous and unthinking persons, who are too ready to pass unjust censures upon your having been so long in so considerable a post and produced little or nothing, as some I have lately met with had the confidence to allege to me. I immediately convinced them of the unreasonableness of such a suggestion, both by informing them of what you have already done, and shewing that you were pleased to communicate, allowing me that liberty which I only made use of for your just vindication. On this account it would be a very great satisfaction both to myself and to others of your real friends if you would please to permit what you have already printed to be published, which no doubt would be a more universal vindication of your great industry and abilities than all that your friends are capable of doing.

I hope the preface of your catalogue, which some time ago you hinted you had in hand, is all ready or will surely be printed, which you told me would prevent the sinister designs of your antagonist. When it is ready I hope you will be pleased to allow me the sight and enjoyment of it, as you have already of what is more valuable, and question not you will be mindful of your promise of some of the prints of your own effigies when a fit opportunity offers. In the meantime desire you will please let me know in your next whether you think fit to depend on me for the calculations of the eclipses of Jupiter's satellites for the next year, or you'll employ your servant to do it, as you intimated you intended. Though I cannot set about it yet, since I shall be taken up with other business which will unavoidably hinder for some time, yet upon notice of your pleasure shall readily undertake it, and you may be assured nothing shall be wanting for your satisfaction or advantage that is in the power of,

Sir, your most obliged friend and humble servant,

ABRA. SHARP.

Flamsteed's opinions on the first edition of Newton's *Principia* have been already referred to. It is evident from the tone of the subjoined epistles, written after the appearance of the second edition, published in 1713, that Flamsteed's views had undergone no modification. The animus displayed by him was not altogether the result of the ill-tempered controversy which had raged between himself and Sir Isaac, nor was it altogether directed against the author of the *Principia*, but rather at the theory upon which the work was founded. Whether rightly or wrongly, Flamsteed's opposition was based upon earnest seeking after the truth. In his correspondence with Abraham Sharp several references are made to the *Principia*, embodying the Astronomer-Royal's reasons for his objections, the following letters being selected as containing such references, viz. :—

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, October 31st, 1713.

SIR,

I am now three months your debtor, for which you will pardon me when I tell you that I have been forced into a suit at law about a trust which fell to my wife, and of which I hope I am now discharged by a decree in Chancery; that my journey into the country has been more troublesome, and my stay there something longer than ordinary.

Sir I. N.'s 6th equation is not allowed by the heavens. He has lately published his *Principia* anew, wherein he makes this equation ablative where it was formerly to be added, and to be added where it was subductive, and has altered his 7th so as in part to destroy it, but I have not yet examined how this will answer, for I have 112 more observations under my man's and Mr. Ryley's hands in good forwardness. I think from what I have already got that not only the 6th but some other of the small equations will be laid aside yet, but I care not to assert anything positively till my double-calculated 180 vouchers are ready.

I should be glad if the new correction S. I. N. or his servant E. H. has given would hold. I will try and let you know the result, but I want three or four more payr of hands such as you to carry on the work, and am heartily sorry you are so far removed from me that I cannot readily make use of you, for S. I. N. still continues his designs upon me, under pretence of taking care of the Observatory, and hinders me all he can,

but I thank God for it, hitherto without success. . . . I think his new *Principia* worse than the old, save in the moon, and there he is fuller but not so positive, and seems to refer much to be determined by observations. The book is really worth about 7 or 8 shillings; it cost 4s. 4d. apiece printing and paper. Dr. Bentley puts the price 28s., and so much mine cost me. I am told he sent S. I. N. half a dozen, and made him pay 18s. apiece for them. Possibly it is not true.

Yours to serve you,

JOHN FLAMSTEED.

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, March 20th, 1714.

SIR,

I told you that the heavens rejected that equation of Sir I. N. which Gregory and Whiston called his 6th. I had then compared but 72 of my observations with the tables. Now I have examined about 100 more, and find them all firm in the same, and 7th too, and whereas Sir I. N. has in his new book thrown off his 6th and introduced one of near the same bigness, but always of a contrary denomination, and a bigger in the room of the 7th. If I reject them both the numbers will agree something better with the heavens than if I retain them, so that I have determined to lay these crotchets of Sir I. N.'s wholly aside. I think if you purchase not the new edition of his book you will be at least 17 shillings a saver by it, for I know not whether after that these two pages aforementioned in the margin are taken away whether all the alterations and additions be worth 12d.

Your obliged friend and servant,

JOHN FLAMSTEED.

In 1714 the problem of "finding the longitude" engaged the serious attention of the Legislature, as it had for generations done that of navigators and mathematicians. Indeed, when Charles II. established Greenwich Observatory, it was made an especial condition that Flamsteed, as Astronomer-Royal, should direct his best energies towards the perfecting of a method for finding the longitude by astronomical observations; and Flamsteed, with Newton and Halley, made

great advances in the subject, but they were prevented from attaining ultimate success by the defective nature of the instruments then in use, and from the want of certain astronomical computations. In 1714, however, the English Legislature interfered for the first time in the matter by offering a reward to any person who should discover a method of finding the longitude at sea, the amount being proportioned to the degree of accuracy obtained, viz.: £10,000 if the longitude were determined within sixty miles; £15,000 if within forty miles; and £20,000 if within thirty miles. No specific method to be adopted was laid down in the Act, except that it was to be true in theory and successful in practice. Commissioners were also appointed to receive reports of methods and to report upon them. Of this body Flamsteed was appointed one.

As might be expected, the prospect of obtaining so splendid a reward stimulated many to offer suggestions and to submit methods, and Abraham Sharp in the following communication to his colleague Flamsteed opens his mind upon the subject. The utter impracticability of some of the proposals is also demonstrated in the succeeding letter from the Astronomer-Royal:—

Letter from Abraham Sharp to J. Flamsteed.

HORTON, *July 31st, 1714.*

SIR,

After a tedious expectation of an answer to my last, sent above three months ago, I find myself under necessity of breaking silence, and take the liberty to remind you thereof. You may be assured I could not but be very solicitous about your health and prosperity after I have remained so long in obscurity and ignorance thereof, especially now that the public accounts abound so much with matter relating to your business (wherein methinks you should not be altogether unconcerned, since you have contributed much to the accomplishment of it), namely, finding the longitude, which I perceive others pretend to, but, I presume, in vain. I cannot apprehend they have either the judgment or experience requisite for such a discovery, which, had it been feasible, 'twas more likely to have

had yourself for its author than any other. I hear Dr. Halley* puts in for it, and, indeed, so great a prize as £20,000 would animate any one to exert their utmost endeavours to obtain it were there any probability. He wants not the skill and experience, wherein I think the others are deficient, but what can be expected from so old and trite way as he proposes, namely, by lunar observations, more than what has been formerly done, without more accurate tables than are yet extant, which only are to be hoped for as the result of your labours. Indeed, I cannot but see the whole affair must be resolved into your assistance and concurrence, since without doubt it cannot be had without observations, and those cannot be depended upon without accurate tables of the fixed stars, luminaries, or planets, wherewith they cannot be accommodated anywhere else. I have not yet seen what has been published by any of the pretenders, but intend to send for them as soon as possible. Can better judge when I see what method they offer.

I suppose the Royal Society has dissolved since they left Gresham College. I have heard nothing of them but what account you have sent me. I have sent several times for their Transactions, but could get none; the bookseller writes there are none printed. Whether it be so or not you can best resolve me. I had good hopes since Dr. Halley has undertaken the business again after Dr. Sloane resigned, who was before forward enough to print, would not have neglected, since he could often supply with matter of his own when others failed. I shall be in pain till I have some account from you as of these matters, especially of your health and the progress and success of your own affairs. I hope you will not defer longer to give this satisfaction to,

Sir, your most obliged friend and servant,

ABRA. SHARP.

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *August 31st, 1714.*

SIR,

About the middle of this month a couple of young Nonconformist preachers from Worksop in Derbyshire came hither to have my approbation of some method they had to propose for finding the longitude at sea, and I shall tell you because it will make you laugh abundantly. They proposed to have two or more strong vessels made of earth or

* In a subsequent letter Abraham Sharp says his supposition of Dr. Halley proposing to find the longitude was grounded upon a mistake and misinformation.

glass, with a vent and stop-cock. The vent was to be filled up with an agate, or some very hard stone or metal that might admit a very small hole to be drilled in it, and then, this hole being closed, all the air was to be pumped out of the vessel by the help of an air pump, and then afterwards they were to open the small hole in the agate, and by a good pendulum clock to see in how long time the vessels should be filled again with air, for this being known they calculated that as fast as the vessel was discharged it would fill again in the same time precisely, and they had a contrivance as proper as this to know when the vessel was full. They also proposed to find it by the times of the high waters in the open sea, which they would find by a barometer and a timekeeper with a thermometer annexed to it, with a table for correcting of the clock. I received them very civilly, but refused to give them my hand to testify that I had seen their proposals, and advised them not to print them. They told my servant Joseph that they had come 150 miles purposely for this business, but I believe they took my advice, for I heard no more of them.

On July the 9th past Mr. Hobbs, a watchmaker, gave me a printed book whence he proposed the finding the longitude by a pendulum clock hanging by a contrivance so as to answer all the motions of a ship, so as he thought that would not affect the pendulum, and last Thursday, one Mr. — Billingsley presented me with a printed proposal wherein he offers, over and above what Mr. Hobbs had done, to make a platform that a person might stand steadily upon to manage a large telescope to observe the eclipse of the heavenly bodies on board a ship. He seemed a man of better sense than Mr. Hobbs, and therefore when I had shown him that, whatever he imagined to the contrary, the pendulum would be shaken by every shock and motion of the ship and vibrations made wider or narrower than they ought to be, and this in the company of some very intelligent persons assented to what I urged, he held his peace, which is as much as I can expect from persons that have swelled themselves with the hopes of getting £20,000.

Yesterday Mr. Conyers Purcell left a letter for me with my servant Joseph, and in it another printed proposal to find the longitude by a waterwheel that should follow the ship and measure its way, which it will do like the way-wiser, over every wave and swell as well as when it is smooth. I have not seen this ingenious gentleman, but, allowing his contrivance to be liable to no other inconvenience but this, it is enough to render it ridiculous.

Mr. Whiston and Mr. Ditton's proposals tend only to finding the distance of a ship at sea from any mark or coast from whence they can see a fire or hear a gun shot at twelve o'clock at night. You know that by experiments made here, November 10th and 15th in the year 1687, it was found that sound came from Shooter's Hill hither in $13\frac{1}{2}$ seconds. The Hill is three miles off, therefore the sound moved one mile in $4\frac{1}{4}$ seconds, so their proposal sinks from finding of the longitude to finding

of the distance of the ship from a sea mark. I am sorry for them, and shall tell you no more of them but order their book to be sent this week to London, to be sent to you by Mr. Hodgson, who shall have a special charge about it.

'Twas their attempt that occasioned the Act of Parliament that proposed a reward for any one who shall discover the longitude. In it I am named one of the commissioners, and this causes the pretenders to make their applications to me so much. If you desire it I shall send you a copy of the Act.

We reckon that the King [George I.] is by this day in Holland, or will be to-morrow. He is to come ashore at Greenwich, to reside two nights in the Queen's House, which is fitted up for him, and make his entry into London in his coaches. God send an happy arrival and reign, for the accession to the Crown has dissipated much of our fears and he is impatiently expected.

Your affectionate friend and servant,

JOHN FLAMSTEED.

The result of the scientific inquiry thus set on foot is now matter of history. For many years the attempt to find the longitude at sea seemed hopeless, but the difficulty was eventually overcome by Mr. John Harrison, by means of a marine timekeeper of his construction. John Harrison was a native of Yorkshire. Before obtaining the promised reward, he made four timekeepers of such exactness that it is said the first made did not vary one whole minute in ten years.* He also made several voyages to the West Indies and elsewhere in order to test the time-keeping properties of his chronometers. As an instance of the procrastinating and illiberal spirit in which Harrison was treated, fully fifty years had elapsed since the passing of the Act before he received the first instalment of £10,000 offered by the Act of 1714. It is doubtful whether he ever did receive the second moiety in full. The

* Harrison's first marine timekeeper had two balances, vibrating in the same plane, but in contrary directions, in order to counteract the effect of the tossing of a ship at sea. Harrison's curious inventions are preserved as curiosities at Greenwich Observatory. One of them was discovered about fifty years ago in a dilapidated state and repaired. Except the escapement, all the wheels were of wood, with wooden teeth. The arrangement for obviating friction, however, was so admirable, that on the removal of part of the escapement the train of wheels ran down with great velocity, although they had not revolved for more than a century before.

records of supplies granted by Parliament in 1773 contain this item:—

“June 14. To John Harrison, as a further reward over and above the sums already received by him for his invention of a timekeeper for ascertaining the longitude at sea, and his discovery of the principles upon which the same was constructed—£8570.”

John Harrison did not long survive the second vote, his death occurring on March 24, 1776, in the 84th year of his age.

Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, July 9th, 1715.

SIR,

You are concerned that you hear not from me. I am as much that I cannot find leasure so often, nor write to you with so much scope as formerly. Assure yourself I have always a due regard to you and respect for you, but I am now sixty-nine years of age compleat, and I doubt not but you will excuse me if I cannot express myself so well and readily as formerly.

A young man, a surveyor in your neighbourhood, was here some months ago, and lately Mr. Thoresby* has been twice here, but I was not good fortun'd to be at home, though I saw and discours'd the former, and had a good account by him of your health, which I pray God long to continue. If he or any friend of yours comes agane to London you may do well to advise me of it by letter, that I may direct them where to meet me and when to find me at home, for I much regret my loss of Dr. Thoresby's company.

I doubt not but you have heard that the Lord Halifax is dead of a violent fever. If common fame speaks true he died worth £150,000, out of which he gave Mrs. Barton for her *excellent conversation* a curious house, with lands, jewels, plate, money, and household furniture, to the value of twenty thousand pounds.† Sir Isaac Newton loses his support

* Of Ralph Thoresby, the celebrated antiquary, a full account will be found prefixed to the second edition of his *Ducatus Leodiensis*, written by the editor, Dr. Whitaker. Thoresby resided at Leeds, was born in 1658, and died in 1725. As an antiquary he was an extraordinary man. Thoroughly devoted to his favourite pursuit, he seem'd to have but one leading propensity, the love of antiquity. To this pursuit he devoted much time and attention, adding to it a knowledge of heraldry and of the Latin and Greek languages of no mean order. His collection of antiquities, medals, and coins was very extensive and valuable, and was sold in London in 1764.

† Charles Montague, Earl of Halifax, courtier, poet, and politician, was Chancellor of the Exchequer and First Lord of the Treasury in 1697. He was the inventor of Exchequer Bills, the convenience of which has been recognis'd ever since. In 1699 he was created Baron Halifax. The title of Marquis of Halifax had just before become extinct by the death of the son of George Savile, the first marquis. He was a staunch Hanoverian, and on the death of Queen

in him, and having been in with Lords Oxford, Bolinbroke, and Dr. Arbuthnot, is not now looked on as he was formerly.

I sent last week for my manuscripts. My man brought me but two of them, the third is in Halley's hands, who is loath to part with it, but Sir Isaac will I doubt not inforce him. Sir Isaac will have still in his hands all the observations made with the mural arc from 1689 to 1713 complete, which I shall recall as soon as I have got back the book that Dr. Halley detains.

I believe I have now an interest in some of the prime officers at court that will not suffer me to be so used as I have been formerly. I shall recall the manuscript of my Observations from 1689 to 1705 complete, and know how he has disposed of £1200 of Prince George's money, whereof I never received but £125. I shall not deal proudly with him, nor call him names as he did me. God forgive him, but I shall use him gently and calmly until I have got what he has of mine out of his hands. God has blessed me hitherto. All that has happened I doubt not was by the order of His good providence, and for the rest I will attend him patiently till my hopes are turned into certainty.

I have begun to revise my Doctrine of the Sphere, in order to reprint it with new lunar tables that shall agree with the heavens within 5 minutes, and leave it to posterity to bring them nearer from the observations I shall bequeath to them for that purpose. I desire you to give my humble service to Mr. Thoresby, and am ever your friend and servant,

JOHN FLAMSTEED.

Extract of Letter from Abraham Sharp to J. Flamsteed.

HORTON, *July 23rd, 1715.*

SIR,

I thank you for your observations of Saturn and Mars, whereby I see their disagreement with Parker's Ephemeris, notwithstanding Dr.

Anne was created Earl of Halifax. After the death of his first wife he conceived a strong attachment for Catharine, widow of Col. Barton, and niece of Sir Isaac Newton. This lady was young and beautiful. He died in May, 1715, and as he left no issue the earldom became extinct. In a codicil to his will, dated February 1st, 1712, he bequeathed to Sir Isaac Newton the sum of one hundred pounds, "as a mark of the esteem I have for so great a man," adding, "And I do likewise bequeath to his niece, Mrs. Catharine Barton, the sum of five thousand pounds, and all the rights, title, and interest I have in a grant from the Crown of the Rangership of Bushy Park, together with all the household goods and furniture belonging thereto; and I also bequeath to her my manor of Apscourt, in Surrey, during her life, in token of the sincere love, affection, and esteem I have long had for her person, and as a small recompense for the pleasure and happiness I have had in her conversation." Lord Halifax also transferred to Mrs. Barton an annuity of £200 per annum, purchased in Sir Isaac Newton's name.

Halley's pretended correction. I was informed by a person living in these parts that he had been with you sometime after I had sent you my last calculation of satellite eclipses, and that you had told him I had committed great mistakes. I am not sensible of any such thing, and upon a review could not discover where they should be, but am confident if there be a mistake in any it must run through all. Have strictly examined them by their differences, and find them mutually agree so well that, if any be faulty, all must. Therefore I rather think it was some misunderstanding in the person, since I have so much confidence in our mutual friendship. If there had been any such you would first have given me notice of it, that the like might be prevented hereafter, before you had published it. However, I could not be unconcerned about it, nor dare I venture upon another calculation till I understand from yourself whether it be so, and where the mistake lies, that I may rectify it, and may not run any more such hazards for the future.

I own I have not calculated Jupiter's conjunctions and oppositions to the sun, but have deduced them from one year to another, and find I have never erred therein above a day or two, which I know to be a matter so trivial, and of so small consequence, since no certain observations can be made near that time, that I believe it deserves not the least notice, but shall suspend my thoughts about that till I hear further from you.

I very rarely, if ever, have any account of the designs of persons that travel from these parts to visit you, nor scarce ever know of their transit till their return. Therefore it is not possible I should give you any previous notice. It is very probable I should never have heard of Mr. Thoresby's being in London had not you informed me. He lives seven miles distant: have very little correspondence with him, knowing him to be a designing person, and intimate with Dr. Halley. Therefore stand always upon my guard when in his company.

Who that young surveyor you mention should be I cannot apprehend, except it be the same I mentioned once, whose name is Sagar, living at ten miles distance, a person I had no acquaintance with before nor know to be a surveyor. However, in compliance with your desire, I am embolden to give you notice that my nephew, Robert Stansfield, designs, God willing, to be in London on Thursday next, the 28th inst., to continue there about ten days, and may be heard of during that space at Mr. Eastman's, a solicitor in Bridge Row, near the corner of Watling Street.

He deals very little now with Mr. Knapp, finding not so good usage, which might be the reason why Mr. Knapp refuses to take in the papers I returned you, as the carrier informed me.

Your humble servant and friend,

ABRA. SHARP.

The oft-recurring problem of the Aurora Borealis comes to the front again in a letter written by Flamsteed to Sharp, and dated March 13th, 1716. The following extract has reference to the subject in question, viz. :—

This day was se'nnight, as my man was helping me up the hill, he told me that the heavens appeared very strangely. I was new come from London, and would have stood still to view them, but was urged to have a care of my health, so hasted into the house. Soon after my wife told me of a strange light she had seen, and streaks or streams of light ascending from the N.W., N., and N.E. up to the zenith, where there appeared flames and clouds so thin that the stars were seen through them; that they broke, and colors appeared on their broken edges as blew, green, yellow, &c. . . . I have an account in your letter of an Aurora Borealis seen by you in Yorkshire, but not so remarkable as this. Pray let me know if any such thing was seen with you in Yorkshire. Our neighbours were all frightened with the appearance. Some conceived that they saw spears and guns, smoke, and headless men in the heavens, but all agree that they saw colors on the edges of the broken clouds, and something like smoke betwixt them. . . . These appearances are frequent in Denmark and Sweden and not uncommon in Scotland, where they are called the *Dancing Sisters*, but enough of these till I can learn more of them.

Sharp's reply was as follows :—

Letter from Abraham Sharp to J. Flamsteed.

HORTON, March 17th, 1716.

SIR,

Yours coming to hand yesterday prevented or rather hastened this, which I intended being the same subject on which yours properly insists, viz., Aurora Borealis, which was observed here at the same time and probably with a like lustre, and no less amazement by the generality of persons, many of whom would needs fancy they saw guns, soldiers, and men fighting, and I know not what wonderful and dismal events they will needs prognosticate therefrom. Yet it was my unhappiness not to see it or hear anything at all of it till next morning, neither had any of my family the least intimation or suspicions of anything of that nature before we were out of bed, the reason hereof I presume might be because the windows of my room where we were are directly east or west and none north or south, else the unusual light would have given some notice of the matter, since none of us stirred out of the house that evening, but the next day every one else who saw it were full of inquiries about it, but intelligence of the neighbour who saw it exceedingly well abroad, walking

home from the adjoining town of Bradford betwixt 7 or 8 in the evening, gave me the best account of it.

It seemed it began about or before 7 o'clock, the streams of light were most brilliant and splendid from that time till after 8, but the light now seemed so strong and clear that after about 10 and 11 he could discern the time when out of doors by his watch, but he did not observe any colors, neither did any that I discoursed with except some fanciful ignorant persons who ridiculously imagined they saw men in red coats, which I presume were nothing but small clouds passing over the enlightened parts of orbs. And, indeed, every one of the same ignorant persons who saw it gave different accounts of it according to their several fancies, which I gave little regard to, but all conclude the light continued very remarkable till morning, and several affirm that near morning it lightened very frequently. The whole country, however, was strangely alarmed therewith, but that which seems most strange to me was that it should be seen at the same instant at places so far distant, which must necessarily infer its vast height in the air, exceeding as I can conceive, the ordinary estimated height of the atmosphere. It was indeed observed here that the verge of the black cloud whence the streams of light issued was a great height, so that they extended near to the zenith, which might be the reason it was so visible in the city, from whence we had an account of it in the newspapers, and in towns where the streets are narrow and the houses high.

These phenomena are rare now, I believe, in England, though more common in northern countries, therefore have been more frightful and startling in these parts. Yet I believe I gave you an account of the like seen formerly here about 14 or 15 years ago*, which was little less splendid than this, though being much lower was not observed with you. There was another considerable phenomenon observed here 3 or 4 days before, viz., on Friday, 2nd inst., betwixt 4 and 5 in the day. Three suns were seen by one of our family who was in the field holding the plough, but being ignorant of matters of that nature, though judicious enough in what relates to his own employment, could learn little or anything of any circumstances, whether there were any circles or colors visible, and how long they continued, he being too interested upon his own business to attend to such observations, though he confidently affirms the truth thereof.

Though I am not so superstitious as to account these prodigies and presages of future events, though they are not common here, but proceed from natural causes, yet they deserve remark, and ought not (scarce can by any that see or hear) to be wholly disregarded, though I have endeavoured to calm the thoughts of some who were too much startled therewith.

It is a great satisfaction to me that you enjoy your health so well

* See Flamsteed's and Sharp's letters, April 8th and June 29th, 1703, on pp. 70-72.

still, considering your advanced age and employments, the encouragement you give me to expect some more agreeable news in your next account, will be very acceptable to

Your most assured friend and humble servant,

ABRA. SHARP.

The Rebellion of 1715 apparently excited alarm in Bradford, and elsewhere in the North, as the following letter written by Sharp to Flamsteed abundantly testifies. The collapse of the Jacobite arms at Preston, in Lancashire, however, saved Yorkshire from actual conflict with the rebels, and the only effect was a scare, sufficient, it would appear, to disturb the philosophic mind of Abraham Sharp as it did many of his neighbours.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, *October 19th, 1715.*

SIR,

Yours of the 11th past I received in due time, but we have been so alarmed and terrified here with the rebels in these parts these three or four weeks past, who have been continually marching towards and approaching so near as gave just occasion and fear they had a design against us, especially considering almost all other parts were guarded with the King's soldiers, whereas these parts were left utterly naked and defenceless, besides a multitude, amongst whom some affirm two-thirds of the inhabitants, and the greatest part of the gentry, clergy, and leading persons dissatisfied, are ready to side with the rebels upon their appearance, some of whom were not afraid to declare as much, notwithstanding the engagements they are under by oaths of allegiance and fidelity lately taken to King George and his Government, but at violating whereof they seemed not in the least to hesitate. By this you may assuredly judge what our apprehensions were, and how little capable any sensible person could be of diverting his thoughts from so imminent a danger. Now, by God's gracious providence appearing for us in the defeat of the rebels at Preston (an account whereof you have had), our fears are in good measure dissipated, and our minds more composed, other common affairs may with more freedom and satisfaction be attended to.

My first leisure I design to employ in discharging as well as I am able the obligations I stand under to yourself, though I have nothing more to offer but my hearty thanks for what you were pleased to communicate of the observations, hoping you carry them on still without

any other hindrance or opposition than what arises from common occurrences and infirmities of age. This is a privilege which we here have, or ought to have, learnt more highly to value, even the exemption from such disturbances as for some time have put a full stop to trade and business, as is the general complaint amongst us, though it is hoped there may be a little revival. But I must acknowledge I feel infirmities and indispositions creeping gradually upon me, being now in my grand climacteric, so that I cannot bear the worryings and fatigues which formerly were not only easy, but delightful to me.

I have been often thinking of what you suggested, viz., instructing some person in the use of my instruments and engines, but I find these matters so little understood or felt in this country that I know not where to find any one either of fit capacity for it or inclination that way, though my instruments could not but be of considerable value, having within the space of the last ten or twelve years laid out upon Mr. Yarwell, while he followed that employment, £10 or more in glasses for telescopes and telescopic sights for different instruments. Yet, should I bestow them all gratis, besides my labour in constructing, I could not engage any person I know, either for want of judgment, inclination, or convenience, to employ them to any good purpose. Therefore must be obliged to wait till some better encouragement be offered. I hope, however, your business proceeds successfully and is near to a desired period of perfection, some account whereof when your leisure permits will be most acceptable to,

Sir, your most assured obliged friend and servant,

ABRA. SHARP.

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *December 17th, 1715.*

SIR,

I beg your pardon for having delayed to answer yours of the 19th past. I have had a cold, and much business on my hands, which now I hope is pretty well over. The Scotch rebellion put us also in some suspense, but since the prisoners were brought up and secured in their proper holds, God be thanked that is over, and we hope that under a prudent and better prince we may enjoy the blessings of peace again, for the remainder of the late rebels we doubt not will be subdued in a short time. I have caused my work to be carried on in the meantime as usually, and I give you here the places of Saturn and Mars last observed. [Observations enclosed.] I could wish that since you cannot find a person fit to be instructed in the instruments you have contrived and made, that you

would bestow now and then a spare hour in writing descriptions of them and their uses yourself, as brief as you please, for the very figures of them with a short description will show their uses sufficiently. I pray God preserve you in health, and entreat you to write to me as often as you can make any occasion, whereby you will very much oblige at all time.

Sir, your real friend and servant,

JOHN FLAMSTEED.

Extract of Letter from Abraham Sharp to J. Flamsteed.

HORTON, January 28th, 1716.

SIR,

The winter has been usually counted the season of vacancy and inaction, especially such as has been here, wherein for these two months there has scarce been three clear days and nights, but continual dark and cloudy weather and thick fogs—though the frost is severe enough—and now a snowstorm. . . . I can learn nothing what the virtuosos and Royal Society are doing. I cannot understand, though I have sent to enquire, that there are any Transactions going out since No. 343 for April and May last. I hope Dr. Halley, since he has undertaken to be clerk again to the society, is not concerned in the Oxford plot. I see Sir Isaac Newton's name subscribed to the Association of the Tower Hamlets. I hope they are both in King George's interest, though I believe Parker* is a rebel in heart, as may in some measure be collected from this and last year's "Ephemerides." I hope ere this you have got a curate for Burstow to your mind, though I believe it is very difficult to meet with any of the young brood of scholars, especially such as are educated at Oxford, who are not tainted with rebel principles. There is one Mr. Allison, a very honest man, who has advanced from a small living in these parts to a better near Liverpool, but in the late Queen's last years, for reflecting upon that Ministry and the peace with France, was thrown out, and now, I hear, resides with Lady Chelk, in Essex. If he be not settled I believe he might be willing to accept of your curacy if not yet supplied. I am prone to think he would suit your temper and desire exactly.

A line or two when your leisure permits is very much desired by,

Sir, your most obliged friend and servant,

ABRA. SHARP.

* The Editor of "Parker's Ephemeris."

The following letters of Flamsteed are fairly reflective of his state of mind on the subject which apparently possessed him more than any other, as his health failed and with it that even balance of mind which is generally supposed to be essential to mathematical study. By some turn of the political wheel, fortune had apparently raised him friends at Court favourable to the object which he had most at heart, namely, that of obtaining possession of the whole of the published edition of Halley's *Historia Cælestis*, or at least so many copies of it as had not yet got into circulation. How far he was successful, and what became of the spoil, appears in the subsequent letters without any doubt. The congratulations of Abraham Sharp, who was to some extent concerned in its suppression, were also forthcoming with all promptitude:—

Extract of Letter from J. Flamsteed to Abraham Sharp.

OBSERVATORY, *March 29th, 1716.*

SIR,

God has in some measure granted me what I desired. Sir Isaac Newton had contrived to dispose of the printed volumes of my observations in such manner that they should have been spread all over Europe as his gift to librarys and ingenious persons, with Halley's copy of my spoiled catalogue of the fixed stars, and a malicious preface of Halley's (that was wrote without my knowledge) to it, as also his abstracts of the planetary observations taken with the mural arc, of which I trusted a copy into his hands to be printed March 20th, 1707. I was fully informed of his intent, and therefore (making my application by proper persons) got His Majesty's order to have 300 copies of them delivered unto me, and last night my man brought them down to the Observatory, though Mr. Churchill was by agreement to print but 400. Sir Isaac Newton has sent 3 copies into Italy, some say to the Pope; 1 to the King of France; to Mons. Sorey and Des Marot each 1; 10 to the Royal Academy of Paris; and about 40 to the Exchequer, of which I am told the French Envoy has had 17, so that there are 9 or 10 left in the Exchequer, and 39 in Mr. Churchill's hands, which I am endeavouring to get into my own hands that I may hinder any more of the false catalogues from going abroad or his very sorry abstracts, which I intend to sacrifice to TRUTH as soon as I can get leisure, saving some few that I intend to bestow on you and such friends as you that are hearty lovers of truth, that you may keep them by you as evidence of the malice of godless persons, and of the candour and sincerity of the friend

that writes to you and conveys them into hands, for I will not say I make you a present of that which is odious of itself and will be detested by every ingenious man. Pray let me know in your next how I may send you this precious parcel.

As for the Aurora Borealis, my wife who saw it affirms that when the clouds broke they saw colors like those of the rainbow, but fainter. But I have seen a letter from Burford which says that there they had a shower of sulphur, that he was afraid of being burnt, and that his perriwig, which he keeps uncombed, ever since has smelt of the stink of sulphur, and was smelt in London by a particular friend of mine—a very sober and ingenious gentleman who was returning home to Greenwich. This is matter of fact.

Your real and obliged friend and servant,

JOHN FLAMSTEED.

In a subsequent letter, dated May 2nd, Flamsteed writes to Sharp :—

I committed them to the fire about a fortnight ago ; if Sir Isaac Newton would be sensible of it, I have done both him and Dr. Halley a very great kindness. Yesterday I sent an attorney to Sir Isaac Newton to demand an appearance for detaining one of my books of observations with 175 manuscript sheets of observations made with the mural arc, but he would not be seen, so a note was left for him by the attorney. You shall have an account of all the proceedings. I am not fond of war.

Again on June 2nd, 1716, Flamsteed continues the subject in a further communication to Sharp :—

On Wednesday last my man delivered to Mr. Hall, the Bradford carrier, my catalogue of the fixed stars, as it is corrupted and spoyled by Dr. Halley. All the faults are marked in it with lines under them ; the stars that are false placed are marked in the margin. When you compare them with my own catalogue (whereof I gave you a copy about 3 years ago) you may perhaps find more errors than I have noted. If you do, pray keep a list of them, and let me have a copy of it in good time. With it, in the same cover, are bound up his sorry abstracts of the planetary observations taken with the mural arc, wherein he numbers the stars according to his own account, but no ways conformable to my own catalogue. He is as lazy and slothful as he is corrupt. With my lunar observations he gives her true places and latitudes, which are copied from the three large synopses that I imparted to Sir Isaac Newton under this condition, *that he should not impart them to anybody without my leave*. Yet so true to his word and so candid is the Knight that he immediately imparted them to Halley, who has printed them as far as they

reach, and afterwards thrust in the moon's places from the Ephemerides, or rather, I believe, from the margin of my book of observations which is now in his hands, for the *lazy* and *malitious thief* would scarce be at the pains to gather them himself from the almanacks.

The book [you require] is directed as you ordered to Mr. Benjamin Bartlett, in Bradford. Pardon so short a letter.

Your affectionate friend and servant,

JOHN FLAMSTEED.

Letter from Abraham Sharp to J. Flamsteed.

HORTON, *April 6th, 1716.*

SIR,

I perused yours of 29th past with extraordinary pleasure, and heartily congratulate you, and rejoice in your success in so far disappointing the designs of your antagonists, who have dealt so unworthily and disingenuously with you in printing your works which you committed to their trust, without your consent or knowledge; disguising and disposing of them at pleasure, and making their own advantages thereof, to your detriment. But your seasonable seizure of so many of the undisposed copies will be such a mortification to them, as well as discourage any attempt of the like nature for the future. But I hope when your own works are made public by yourself, their malicious designs will be manifestly exposed, so as will redound not only to their frustration, but to their own shame and confusion. I cannot but be gratefully sensible of your kind offer to send me some of the copies which have been seized by you, and shall be very glad to see and compare them with your true and genuine observations and catalogue, when I may be possessed with just sentiments of their indirect and sinister designs. I shall take all necessary care when they come to hand to keep and order them as you shall propose. The best way of sending them to me will be to get them conveyed to the White Horse, in Cripplegate, there to be delivered to some of the Bradford carriers, one of whom is for a week in London on Wednesday after next and Thursday morning till noon on that day, but desire they may be directed to Benjamin Bartlett, bookseller in Bradford, Yorkshire, not at all mentioning my name, for by that means more care will be taken of them, and they will the more safely and with less suspicion be conveyed to my hands.

The account you gave me of the Aurora Borealis is very remarkable, and gives just reason to believe it to be, if not a prodigy, yet more than a common phenomenon. Since there was such a scent of sulphur, and something actually set on fire by it, it would seem those

streams of light were somewhat of the nature of lightning. The colours you mention were observed here by a very judicious person, who gave me the fullest account of it. I see in the news that Dr. Hans Sloane* is to be made a baronet, and would gladly know how that comes about.

It is very great satisfaction to understand you proceed with the printing of your books, and especially if you are preparing prefaces, wherein I doubt not you will set all matters in the true light, that the world may be rightly informed, and their irregular methods exposed to due shame and contempt. In order thereto, it is my hearty desire and prayer that your life and vigour may be maintained than which no earthly thing can be more acceptable to

Your most obliged friend and humble servant,

ABRA. SHARP.

In a subsequent letter, dated December 1st, 1716, Mr. Sharp refers to the necessity of showing the difference between Flamsteed's true and the surreptitious edition of his catalogue by Dr. Halley, and to this letter Mr. Bailly adds as a note in his "Life of Flamsteed":—

There was no person so capable of judging of the respective merits of the two works alluded to as Mr. Abraham Sharp, who had himself borne so prominent a part not only in making instruments and observations, but also in computing the results, and in forming the maps; one who was in fact conversant with every branch of practical astronomy.

The following letters close the correspondence between Flamsteed and Sharp. For some time previous to the dates of the letters given below the handwriting of the Astronomer-Royal, now in his 71st year, had become very crabbed and irregular, and occasionally the body of his letters was written at his dictation by his faithful servant, Joseph Crosthwait, Flamsteed adding his signature. His last letter to Sharp,

* Sir Hans Sloane was born April 16, 1660. In the words of his biographer he was a Scotchman by descent, an Irishman by birth, and by education and residence an Englishman. From his earliest years he seems to have shown marks of attachment to natural science. In 1684 he was elected to the Royal Society, and having served as Secretary for some years, was in 1727 elected President, in succession to Sir Isaac Newton. He was physician to three British monarchs—Queen Anne and her two immediate successors. He was created a baronet by George I. Sir Hans Sloane was the founder of Chelsea Gardens and the British Museum. He died in 1751, aged 90.

however, dated November 24th, 1719, about a month prior to his decease, is in his own handwriting:—

Extract of Letter from J. Flamsteed to Abraham Sharp.

THE OBSERVATORY, *May 2nd, 1717.*

SIR,

I am heartily glad to find your health continued. I can still, I pray God for it, walk from my door to the Blackheath gate and back, with little resting at some benches I have caused to be set up betwixt them, but I have found myself so tired with getting up the hill when I returned from church that I have at last bought a sedan, and am carried thither and back in state on Sunday morning. I hope I may employ it in the afternoons, though I have not hitherto by reason of the weather.

The Duke of Marlborough has lived in the house that was the Earl of Derby's as I remember when you lived with me. He walks feebly, but his memory is good as ever, and his servants tell us he never was touched in that part, whatever reports the Jacobites have spread to the contrary. He sometimes rides on horseback in the park or heath, sometimes in his coach. He likes the air of this place so well that he intends to spend a part of his summer here, and 'tis hoped will recover his strength. We talk here of paying off and laying up a dozen ships, and disbanding 14,000 men, whence you will conclude that the King is not much concerned for the Swedes' fleet or forces. Pray let me hear from you sometimes: you will thereby very much oblige me. I pray God keep you in health,

And am your sincere friend and servant,

JOHN FLAMSTEED.

Extract of Letter from Abraham Sharp to J. Flamsteed.

HORTON, *August 18th, 1717.*

SIR,

Mr. Thoresby has been with me lately, and was very inquisitive about your concerns. I was a little jealous of him, only giving him an account of Sir Isaac Newton and Dr. Halley's unworthy promises to you, and your seizing up of the impression they had fraudulently made of some of your works they had injuriously detained. He desired to see that copy thereof which you sent me. I made no scruple to show it him, not having any orders to the contrary, nor apprehending how it

could redound in any way to your prejudice, especially since I knew he understood little or nothing of matters of that nature, which he manifested by his not taking notice of anything therein except two lines you had drawn crossing everywhere, which upon his inquiring I informed him were on account of the multitude of errors you had found therein, notwithstanding the Doctor's boast of his great performance. . . .

ABRA. SHARP.

Letter from J. Flamsteed to Abraham Sharp.

Given in Fac-simile on page 129.

THE OBSERVATORY, *June 28th, 1718.*

SIR,

Yours of the 24th instant came to hand yesterday about 4 afternoon. I am glad to find you approve of the figures of which I sent you a specimen. My man has agreed with the printer about the sheets at a rate which I am pleased with, but I fear the printer will complain of, for I am apt to think he will find the work which he reckons to be but $0\frac{1}{2}$ d. more in a sheet than his usual rate will be more than double.

Pray let me know if you desire any number of copys to be taken for your owne use or to give away to your friends, for I print but 500 (as many as I have done of my catalogue), and what you desire more I will procure paper for. Pray answer this particular as soon as you did my last.

I am of opinion it will be best to leave out the tenths of seconds, for we can not be sure of any measures we take in the heavens nearer than a $\frac{1}{4}$ of a minute, and therefore it is a needless exactness to calculate nearer than 1 or 2 seconds, and besides I have heard Dr. H. sneer and make sport with the periphery of the circle, done in twice the number of figures that Van Culen did it, and I would not give him any further occasion. The world will see by your last book* that you can both excell him in reasoning and abide the labor of calculation, whereas his talents are only quick talk and confidence.

As for the differences, I will do what I can that they may be rendered regular. I have talked with my man about them.

J. Hodgson has produced the letter before E. H. R. S. Their answer was they were put into Dr. Thorp's hands. This was on Thursday was

* "Geometry Improved."

seven-night. What was done last Thursday I have not heard, but may this night by my man, who is gone to London, or by Mr. H. if, as I expect, he comes down hither. Their Secretary will doe what he can to shuffle off the business or appease Mr. H., but it will not be easy to doe it. I pray God keep you, and am ever,

Your reall friend and servant,

JOHN FLAMSTEED, M.R.

Extract of Letter from Abraham Sharp to J. Flamsteed.

HORTON, October 6th, 1719.

SIR,

. . . . Mr. Thoresby was with me not long ago, accompanied by a gentleman, one Mr. Warburton, who is making a new survey of our county in order to draw a large map thereof. Our discourse was of two matters. I remember not that Dr. Halley was mentioned, though Mr. Thoresby has always expressed a word for him, therefore I have always, when in his company, been upon my guard, and I know not that ever I told him that I had any of your works; but knowing that he is no genius that way, nor any inclination to astronomy or any part of the mathematics, should he mention anything of that nature—I think he never has to me—it would serve only to augment my suspicions, and render me more cautious.

ABRA. SHARP.

Flamsteed's last Letter to Abraham Sharp.

THE OBSERVATORY, November 24th, 1719.

SIR,

I am sensible of your kindnesses, and every letter I ever saw from you makes me forget something of the pains caused by my distemper, which is not now the stone, but a shortness of my voice that is almost continually upon me. My doctor, a physician of nearly my own age, prescribes me two ounces of gum arabick, dissolved in five pints of good water, and boiled down to two quarts, moistened with sugar or sugar candy. He adds to it pure milk, and requests me to drink often of it, about quarter of a pint at a time. I have

8th
 19th of 12th The Observatory Jan^y 18 20 24 18
 I am glad to find up approval of y^e figure of which I sent you
 a specimen. my men has agreed with y^e number about the
 sheet at a value which I am satisfied with but I fear the
 printer will complain of for I am apt to think he will find
 y^e more which he wishes to be but as most on a sheet
 then he usually will be more than I doubt.

Every body knows if y^e desired any Number of Copies
 to be taken for y^e own use or to give away to y^e friends
 for I print but 500 as many as I have sent of my Catalogue
 which y^e desire in one small printed paper for. I pray
 consist the particular as found as y^e did my copy.

I am of opinion it will be best to bound out the title of
 society, for now you not be sure of any measure now take
 my friend now up to 1/2 of a month & therefore it is a
 necessity to be taken to be taken now or 2 months
 before I have to send Dr H. Jones and make great with y^e
 philosophy of y^e first deal before y^e number of figures
 Van Cullen did it. I would not give him any further
 occasion the Word will be by y^e last book of y^e 1st book.
 send him in answering & about y^e book of Abraham on. which
 he has and only quick talk & understand.

As for y^e difference I will do what I can that they may
 be rendered as regular as time. I have talked with my
 men about them.

J. Hodgson has produced of other paper E.H. R.S. which
 on paper was if they were put into Dr Thoms Remdr.
 the way on Thursday was fourpence. what may be done
 last thing day I have not heard. but may. the night of
 men who y^e good to London. or by M.H. if at New York
 town down here. their society will do. what has
 been to the best of the business or up to M.H. but it
 will not be easy to do it. I pray God keep y^e com
 mune.

I shall send
 John Flamsteed
 11

taken it three or four days with good effect, for my pains are much diminished, tho' not yet fully removed.

I have yours of October 6th. I owe you a good deal more than the tracts of Mr. Hook's are worth. Please to accept and make no more words about them.

The last sheet of the tables and latitudes and declinations will go into the press to-morrow; my preface in a month's time, God sparing my life and health, though with pains; and after them the planets' places. These fill at least twelve sheets; how many the like prolegomenes or prefaces will fill I know not, for I shall enlarge on some necessary things and shorten those that are less needful. Parker's Almanack for the next year, 1720, is out, but without the planets' places in it. I know not the reason, but you know the man—thence you may guess at it. Dr. Halley has showed his new tables at the Temple Coffee House, but I am told by one that dwells in London they are not yet finished. Mr. Pounds has furnished him with my corrections of Mars and Venus. La Hivre's Mercury is more correct than Street's, but Saturn and Jupiter will find work for those that come after us. I long to see what he does with them. Long life and happiness is ever wished by,

Sir, your affectionate friend and servant,

JOHN FLAMSTEED.

Abraham Sharp's last Letter to J. Flamsteed.

HORTON, *December 1st, 1719.*

SIR,

Yours of the 24th past came very seasonably to dissipate my fears and the sad apprehensions which your so long silence occasioned. I am, however, gratefully sensible of the particular expressions of the signal kindness therein, which are much more obliging by the great difficulties you labour under by your continued indisposition and pains, with which I cannot but sympathise. It is to me a great satisfaction that you have found any relief and ease, and look upon myself as much obliged by your freedom in communicating the doctor's prescription whereby you obtained it, which I am under some apprehensions I may sometime have need of.

I am very glad to understand that, notwithstanding all the inconvenience you are encumbered with, your business is not thereby retarded, but that the Press proceeds so successfully, and that you are enabled to carry on your operations for keeping it at work. That your preface is in such forwardness is very grateful news, but not a little surprising you

should have collected such a quantity of the planets' places (I suppose deduced from your observations) as will fill twelve sheets.

If these had but come to Dr. Halley's hands before he had produced the tables he is designing to publish, they might have been very advantageous to him, and rendered his tables more correct than they are like to be, but will be subservient for their examination and detecting their deficiency, and cool his boasting humour, though no doubt he has derived all the assistance he can from your observations so unjustly obtained by him and Sir Isaac Newton.

I find in the last Transactions, No. 361, a set of tables said to be made by Mr. Pounds, for calculating the eclipse of the first satellite of Jupiter, which, if true, will be an easy and ready method; but I find the result in those two instances wherein they are exemplified differs 8' or 9' from those deduced from your tables. Whether of them come nearer the truth must be ascertained by observation. My hearty prayers for your restoration, continuance, and confirmation of your health, and for the success and satisfactory results of all your affairs, will ever be accounted the duty of,

Sir, your most obliged friend and servant,

ABRA. SHARP.

The death of Flamsteed was announced to his old colleague and correspondent, Sharp, by Joseph Crosthwait, the assistant of Flamsteed, immediately after his decease as follows :—

Letter from Joseph Crosthwait to Abraham Sharp.

THE OBSERVATORY, *January 2nd, 1720.*

SIR,

Knowing that a very useful and friendly correspondence has for many years been carried on between you and that great and good man, Mr. Flamsteed, I think it a duty incumbent upon me to let Mr. Sharp be timely informed of his decease. He was taken ill on Sunday last at about a quarter past twelve at night, and continued to vomit up everything he took till Thursday at night, when about 38 past 9 it pleased God to take him. I shall always lament the loss the public will have of so valuable a man.

Your tables are all printed excepting two pages, which shall be finished in a little time. If there were any papers of yours in Mr. Flamsteed's hands that you desire may be sent you, be pleased to let me know, and it shall be done. In the meantime I am, with the greatest respect,

Sir, your most humble servant,

JOSEPH CROSTHWAIT.

P.S.—Please to let me know how a funeral ring may be sent you.

It is surely not to the credit of astronomical science that the last resting-place of John Flamsteed, the man who reduced astronomy to a practical science, should scarcely be known, and that no sepulchral monument exists of him ! Yet such is the fact. There is a tradition that his remains were laid in the chancel of Burstow Church, but no inscription marks the spot, nor is the fact absolutely certain. In order to obtain whatever evidence existed on the point from the parish registers of Burstow, we communicated with the Rev. T. B. Sikes, rector of Burstow, and the following note received from the rev. gentleman in February last may be taken as conclusive upon the matter:—

BURSTOW RECTORY, SURREY,

February 17th, 1888.

DEAR SIR,

There is neither monument nor tombstone in this church or churchyard to the memory of the Rev. John Flamsteed, but the fact of his burial and that of his wife are recorded in our register-book thus—

“1720.—January ye 12th, the Rev. Mr. John Flamsteed, rector of this parish.”

“1730.—August 17th, Margaret, ye wife of the Rev. Mr. Flamsted.”

We suppose that Flamsteed is buried in the chancel, but we could not prove it when we had the whole of the pavement up three or four years ago, when the church was undergoing restoration. There is a monumental slab within the rails to Flamsteed's father-in-law, Dr. Cooke, who died about 200 years ago, and was also rector of Burstow. Mrs. Cooke is also buried there.

I am, yours truly,

T. B. SIKES.

CHAPTER IV.

Abraham Sharp and Joseph Crosthwait undertake the completion of the *Historia Cælestis*—Vexatious delays in the publication—Letters from Crosthwait to Sharp—Completion of the *Historia Cælestis*—The ingratitude of Mrs. Flamsteed—Description and contents of the *Historia Cælestis*—Abraham Sharp's share in its compilation.

After the death of the Astronomer-Royal, the work of correcting the many minute observations made by him, and contained in his British Catalogue, could only have been undertaken by his two assistants, namely, Abraham Sharp and Joseph Crosthwait, the former at the beginning and the latter at the close of his career. Upon them, then, devolved this duty, and devotedly they carried it forward to completion. To Sharp and Crosthwait alone the world is indebted for the final correction and publication of the British Catalogue as printed in the *Historia Cælestis*.

Serious as the undertaking was, there is little doubt that it would be congenial to Mr. Sharp's taste. It was somewhat of a drawback, however, that the two coadjutors were at so great a distance from each other, and that Mr. Sharp was over two hundred miles away from the printers. Considerable delay must therefore have taken place in the transmission of proofs and revises, without which Sharp's acute sense of accuracy would not have been satisfied. His fitness for the task was undoubted, and if evidence were requisite on this point, it is furnished in the following letter

forwarded by Mrs. Flamsteed to Mr. Sharp some months after her husband's decease :—

Letter from Mrs. Flamsteed to Abraham Sharp.

GREENWICH, *August 15th, 1720.*

SIR,

Had I not been under the greatest grief possible for the death of Mr. Flamsteed, which made me incapable of almost everything, I had sooner acknowledged the great obligation I am under to you for undertaking so laborious a work as drawing the lines of the divisions and laying down the stars. If your friendship to poor Mr. Flamsteed during his life and regard to his memory, now dead, had not prevailed with you to undertake so troublesome a work, I know not what I should have done as to that part of it for which no other person's judgment nor any hand was so qualified, because you exceed all others as much in fidelity as you do in accuracy.

I must add that, as this is the greatest instance possible of your friendship to Mr. Flamsteed, I am sorry to say I can only give you my most hearty thanks for it. For it is as much above my making a proper return as it is beyond what I could have hoped for. I design to put those six constellations you sent into the hands of a person to draw as soon as possible. The preface is sent to a learned gentleman to translate into Latin. The rest Mr. Crosthwait goes on with as fast as he can, and I believe will keep pace with the printer and engravers and others concerned.

I am, sir, with the greatest gratitude,

Your most humble servant,

MARGARET FLAMSTEED.

Much of the labour of compilation and of preparing "copy" for the printer devolved upon Joseph Crosthwait,* and the

* In one of his communications to Abraham Sharp, Flamsteed describes Crosthwait, his then assistant, as "a Cumberland youth." The family of Crosthwaite are of very ancient descent in the parish of Crosthwaite, Cumberland, and are very numerous there at the present day. By the kindness and research of J. F. Crosthwaite, Esq., F.S.A., of Keswick, we have been favoured with some particulars of the family, although not sufficiently direct to enable us to trace the connection of Joseph Crosthwait with it. The earliest member of the family of which any record exists was one Sir Adam de Crosthwaite, who, about 1330, received a grant of land in Setmabannick, now called Setmabanning, in the ancient parish of Crosthwaite. In the seventeenth century the descendants of Percival Crosthwaite formed the elder branch of the family and resided on the estate of Setmabanning, and the Crosthwaites of Monk Hall and Keswick were descended from the main line. The family also sent out offshoots, who settled in distant parts of the country. Looking into the parish registers, Mr. Crosthwaite found the following entry among the list of baptisms, viz.:—"Baptised Nov. 22, 1674, Joseph, son of Thomas Crosthwaite, of Setmabanning, and Mary

necessity to keep his colleague at Horton fully acquainted with what was being done involved an extensive correspondence.

The letters of Crosthwait relate principally to the difficulties, impediments, and delays which still prevented the work from being brought to a final conclusion. But for the extraordinary exertions of Crosthwait and Sharp, the astronomical world must have been satisfied with the meagre and garbled edition published by Halley. But the Catalogue was re-examined by Crosthwait and compared with the Observations, and afterwards reprinted with several amendments. The preface cost much trouble to the editors. It was written in English, but was required to be translated into Latin, according to the custom of the period with books of that character. No one, however, could, for some time, be found adequate to the task, though repeatedly attempted. Mr. Pounds undertook it, but eventually declined it, and it was at last accomplished. The third volume was at length finished, and the whole work was completed in 1725, six years after Flamsteed's death.

There remained now only the maps, the construction and engraving of which appear to have cost as much trouble and vexation as the letterpress, but arising from a totally different source. It seems that only one of them was completely finished (Orion) when Flamsteed died. For the rest the astronomical world was indebted to Abraham Sharp, who constructed them anew, according to Flamsteed's principles, from his catalogue. Sir James Thornhill drew the figures of the constellations and recommended engravers for the work, but the charges of the English artists were considered so enormous that Mr. Crosthwait went over to Holland for the express purpose of engaging some of the best Dutch engravers to complete the work. The vexatious delays which necessarily occurred by adopting this method, its increased expense, and

his wife." This Joseph was the third son of the family, but whether he was the future assistant of Flamsteed we have no means of knowing. From the date and place of his birth, however, it seems almost certain that he was the "Cumberland youth" described by Flamsteed.

the constant attention requisite to prevent mistakes, dispirited Mrs. Flamsteed, and a temporary stop was eventually put to the work, although Mr. Sharp (now much advanced in years) and Mr. Crosthwait were willing to continue their services. At length, some English engravers being found who offered to execute the maps at a moderate expense, the labours of these gentlemen were renewed and continued till the time of Mrs. Flamsteed's death, which took place on July 29, 1730. Here the correspondence ceases, probably on account of the circumstances mentioned in the last letter written by Crosthwait to Sharp, from which it appears that Mrs. Flamsteed did not leave either Mr. Sharp or Mr. Crosthwait a single farthing for all their services; neither had they received any remuneration since Mr. Flamsteed's death for all their unparalleled exertions on her behalf.

Professor Bailly, from whose concise summary of the nature of the correspondence alluded to we have largely drawn, says:—"It will doubtless be considered somewhat singular that these facts should never have come to light before the discovery of Flamsteed's correspondence with Sharp, and more especially that Flamsteed did not take the precaution of placing them on record, so that they might have formed a part of the preface of his work. The subject is more than once alluded to in the correspondence; but not a word of this kind is mentioned in the *Prolegomena*, printed in the third volume of the *Historia Cælestis*, where it ought to be found. The inference is, that such part, if ever written, has been suppressed by the widow and the nephew of Flamsteed, who were either unwilling to excite any controversy, or unable to cope with their two powerful opponents, Newton and Halley; the former then President of the Royal Society, and the latter just appointed to be Astronomer-Royal. However this might be, it is to be regretted that some explanation was not given of the circumstances under which the work eventually appeared."

That these facts were well known at the time, and that Mrs. Flamsteed partook of the spirit and indignation of her husband, is evident from the following circumstance. In the Bodleian Library there is a copy of Halley's edition of the *Historia Cælestis* of 1712, presented by Sir Robert Walpole, in which the following letter from Mrs. Flamsteed to the Vice-Chancellor of the University is inserted, viz. :—

GREENWICH, *March 22, 1726.*

REVEREND SIR,

I had the honour of yours, dated November 7th, in which you were pleased to mention the favourable acceptance of three volumes of the *Historia Cælestis*, transmitted by the late Lord Bishop of Chester. I have been since told that there remains in your public library, one volume printed in the year 1712, which passes as the genuine work of Mr. Flamsteed. I most humbly intreat that you will please to order that single volume to be removed out of your public library, the greatest part of which is nothing more than an erroneous abridgment of Mr. Flamsteed's works, he not being concerned in the printing any more of that book than 97 sheets; the rest being done without his knowledge or consent; which 97 sheets will be found upon examination and comparing all that agrees with those three volumes which have had the honour to be received by the University.

I must further add that if that single volume had been fit to have seen the light, Mr. Flamsteed had never been at the trouble and expense to have printed his own works without any allowance for so chargeable an undertaking.

I beg your pardon, Reverend Sir, for giving you this trouble, and I persuade myself you will easily excuse me when you consider that I am under an obligation not only to do justice to the memory of Mr. Flamsteed, but also to prevent the world's being imposed upon by a false impression.

I am, with great respect, Reverend Sir,
Your most humble servant,

MARGARET FLAMSTEED.

To the Reverend Dr. MATHER, Vice-Chancellor of Oxford,
at Corpus Christi College, Oxford.

The letters of Crosthwait, written at Greenwich, and forwarded to Sharp at Horton, number sixty-four, and describe the difficulties encountered in the completion of

the work. Unfortunately, owing to the inability at present to decipher the shorthand notes of Sharp, his replies upon these and other questions remain unknown. Probably they were in accord with those of his colleague at Greenwich. The following letters refer to the position of affairs after the death of Flamsteed :—

OBSERVATORY, *January 30th, 1719.*

SIR,

I return my hearty thanks for yours of the 9th instant, to which I would long before now have returned an answer could I have given you an account in what posture Mr. Flamsteed had left his affairs, but as that was not in my power till now, I hope you will pardon my long silence. He has by will given Mrs. Flamsteed about £200 per annum in the Exchequer and South Sea stocks during her life, and this, after her death, to be equally divided between John Flamsteed's children and Mr. Hodgson's. He has besides given Mrs. Flamsteed about £50 per annum, which came by her, to be solely at her disposal. This is all he has disposed off, for as to his ready money, which may amount to £35, books, manuscripts, and printed copies of his works, he refers to a schedule annexed to his will; but none being found, I presume this must go between Mrs. Flamsteed and Mr. Hodgson, who are executors. This is what made him so uneasy the last day of his life, when, though he was very sensible, and so continued till the last, yet his speech failed him so very much that he could not express what he wanted. He then called for me, and would gladly have said something to me, but was not able, though he could call for me by name, and continued to do so till the last moment.

You will see by this that he has not left me in a capacity to serve him, notwithstanding he has often told me he would, but this I impute to his not being sensible of his condition till it was too late. But the love, honour, and esteem I have and always shall have for his memory and everything that belongs to him will not permit me to leave Greenwich before, I hope, the three volumes are finished.

His preface was never, in fact, printed; what you mentioned to have seen must be a part of what Dr. Halley wrote to his catalogue, which I think you have, for his concludes with an account of the latitude of the Observatory, and its difference of latitude from Paris. Mr. Flamsteed's preface is all wrote in English, but as to the alterations, he meant little more excepting the putting of it into a different method; for it is now the general preface to all the volumes, and so designed to go along with the catalogue, and he intended to have separated it, and to have put what related to every volume with the volume it belonged to. The planets' places derived from the observations made with

the mural arc are wrote for the Press, and the observations are printed to July, 1717. Mr. Flamsteed's effigies are not engraved, but I hope it will not be long before they will, and then you may depend upon half a-dozen, with six copies of your tables of declinations, for I have communicated to Mrs. Flamsteed what Mr. Flamsteed, to my knowledge, had always promised you, and she told me that this or anything else that he intended for you shall readily be complied with.

She is willing to print your quadrature and declinations. I must therefore desire that you please to inform me whether you would have it printed in Latin or English, and what title you would have before it. The constellations are all left undone, except the map of Orion, but if proper help could easily be obtained, I doubt not that a way may be found out to finish them likewise. The maps must all be drawn again, and the stars laid down upon them from the new catalogue, but how this can be done I know not, for it will take up my whole time to attend to, transcribe for, and correct the press. The further account of these affairs, and what other progress is made therein, shall with your leave from time to time be communicated to you by,

Sir, your most faithful humble servant,

JOSEPH CROSTHWAIT.

P.S.—Dr. Halley succeeds Mr. Flamsteed here, and Mr. Pounds at Burstow. It is surprising to me that a person so notoriously disaffected to the present Government should find encouragement at this time.

GREENWICH, *December 10th, 1720.*

SIR,

Since my last, Mrs. Flamsteed has had some offers made her in favour of Mr. Flamsteed's works, particularly about engraving all the maps necessary of the constellations in Mr. Flamsteed's catalogue, but as they propose this to be done in about a year's time, I am afraid it will be impossible to comply with this favour excepting you will be so kind as to draw at your leisure the rest of the charts of the constellations. Without you undertake this, the thing can't be done in time, for I do assure you not one person upon earth has given the least assistance to this work beside yourself, for which Mrs. Flamsteed is willing to gratify you to the utmost in whatever way you shall choose, besides making due acknowledgment in the preface for the part you have so generously and readily undertaken in order to complete Mr. Flamsteed's works.

We hear nothing further as yet of Dr. Halley and the office of the Ordnance, but I believe in a little time we shall, for I am informed

the Attorney-General has been consulted by them in this affair, and has given his opinion against the office, because it does not appear by their books that they ever either repaired or made any instruments at their expense, but, however, he says he thinks it proper to present the bill in the Court of Exchequer to oblige Mrs. Flamsteed to set forth what title she has to them, but he further declares it his opinion (which I have seen by means of a friend) that if Mrs. Flamsteed can prove that Mr. Flamsteed repaired the instruments, it will be strong presumption that the property is hers.

I am, Sir,

Your most obliged humble servant,

JOSEPH CROSTHWAIT.

GREENWICH, *March 25th, 1721.*

SIR,

I think in a former letter I told you the Attorney-General had given his opinion against the Ordnance, but at the same time he advised a bill to be preferred against Mr. Flamsteed's executors, to oblige them to declare what they know of this affair. They have since preferred a bill accordingly, to which Mrs. Flamsteed and Mr. Hodgson have given an answer, but whether the Board upon this will drop the matter I cannot tell, but this we shall know next term.

JOSEPH CROSTHWAIT.

The concluding sentences in the two previous letters have reference to the attempt on the part of the Ordnance Department to claim the instruments in the Observatory at Greenwich as the property of the Government. Dr. Halley, upon receiving the appointment of Astronomer-Royal in succession to Flamsteed, claimed the instruments, and made strenuous endeavours to induce the Government to purchase additional ones. Shortly afterwards Crosthwait again writes to Sharp :—

LONDON, *June 1st, 1721.*

SIR,

Sir James Thornhill and Mr. Vandergucht, junior, dined with Mrs. Flamsteed about a fortnight ago, at which time he promised to see

to the maps being well done. He gives a very good character of Vandergucht, and says he is the best engraver of history that ever was in England. Dr. Halley makes no overtures for obtaining the mural arc; nay is he so far from thinking of that instrument that he has pulled down the meriodional wall upon which it was fixed. He has built a little covered shed between the study and the summer house, and has fixed a stand in the ground which stands about 4 ft. high. What he intends to put upon it I cannot yet learn; but as yet he has done nothing, neither has he anybody to visit him, and bears such a very bad character that I believe he may make observations by himself.

He has lately made me an offer, which sufficiently shews his intentions, by a friend of mine in the Office of Ordnance, which I rejected, so that I believe he is now convinced that it is not in his power to get me into measures that might be prejudicial to anything that belongs to Mr. Flamsteed.

If you please to let me know your sentiments as soon as you conveniently can, you will very much oblige

Your most obliged and humble servant,

JOSEPH CROSTHWAIT.

The trouble and vexation endured by Crosthwait in superintending the printing of the *Historia Cælestis* were more than enough to have disheartened a lukewarm friend of science, and it was aggravated by the getting out of the engraved plates of the constellations. These were drawn by Mr. Sharp and forwarded to London for the engraver, and they were so exceedingly fine in the drawing that few engravers cared to attempt the reproduction of them. Selection, however, was made of one or two engravers, with the result already partly detailed, and more fully in the following extract of a letter written by Crosthwait to Mr. Sharp:—

LONDON, 4th April, 1722.

SIR,

Yours of the 20th March came safe to hand, and on Friday the 30th, I received the two planispheres safe. They are performed beyond anything that I ever saw. . . . Since I received your planispheres I have been with Mr. Vandergucht, and he asks 8 guineas for drawing in the images, though I offered to stand by him and give him all the assistance in my power. I offered him 5 guineas, but he was pleased to tell me that he thought his labour worth 20

shillings a day. He has done the map of Leo and Taurus, for which he says he expects 30 guineas, though Mr. Vertue, who engraves much better, asks no more than 10 guineas. Nutting, the engraver, has sold the plates that were trusted to him, so that I can justly say of all the trouble I have met with since Mr. Flamsteed's death, none has come up to this. What to do I know not, but if you approve of it, I intend to go to Holland and try their engravers, and if I find they are as extravagant in their demands as they are here, it will be impossible to do them. But the planispheres, come what may, shall be done; and whatever share of the profit is made you please to demand shall readily be paid.

JOSEPH CROSTHWAIT.

Mr. Crosthwait's experiences during his visit to Holland are pathetically narrated in the following letter, written to Mr. Sharp after his return:—

GREENWICH, *June 26th, 1722.*

SIR,

On the 16th of April last I sailed for Holland, and met with a long and dangerous passage, not arriving at Rotterdam till the Sunday morning following. I spent all the week after enquiring for engravers, but could not meet with one capable of doing the maps to satisfaction, and having a recommendation to a merchant at Amsterdam, and being informed that there were several persons there who were well versed in works of that nature, I left Rotterdam and reached Amsterdam on the 29th, and after staying there a fortnight, and a great deal of trouble and expense for want of knowing the Dutch language, I agreed with two engravers jointly, who have undertaken the whole for 75 guilders each map, the plates included, which is £6 16s. 6d. of English money, which is much cheaper than they could be done here, and I hope they will be better performed if the engravers answer the characters given them, one being esteemed an excellent engraver of maps, the other as good for history.

After my return from Amsterdam I waited five weeks at Rotterdam for a passage, and at last had the good fortune to come home in the same yacht that I went over in. This has saved Mrs. Flamsteed 5 guineas, I having a friend on board who is steward of her that obtained my passage free. What reward for this and all the fatigue and trouble I have endured (besides loss of time, which my circumstances can ill admit of) I am to meet with from Mrs. Flamsteed and Mr. Hodgson I know not, never having made any bargain with them, nor ever as yet received anything from them.

With sincerity and truth,

Your obliged, humble servant,

JOSEPH CROSTHWAIT.

Repeated disappointments from the engravers in Holland took place, one of the plates was lost in coming across the water, but at last, after months of delay, the whole of the plates of the maps arrived.

The translation of the preface also proved a stumbling-block to the publication of the work. The task had been attempted by the master of a grammar school, but the result was declared to be both bad Latin and a misrepresentation of Flamsteed's meaning. It was then at a standstill, but was afterwards translated by the Rev. Mr. Anderson, a Presbyterian minister living in London. In a letter dated Greenwich, April 17th, 1725, Crosthwait writes to Sharp in reference to Flamsteed's suppressed vindication of himself alluded to by Baily on page 136:—

Mrs. Flamsteed and Mr. Hodgson have determined not to let Mr. Flamsteed's letter to Doctor Wallis go along with the preface, though I'm sure he intended it should, for what reason I know not. I doubt not but you have perused and fully considered what Mr. Flamsteed has therein offered, because in a letter of yours, September, 1719, you seem to press him to make it more public by letting it go in his preface.

The *Historia Cælestis* was at last published, but not completed, the whole of the charts for which Mr. Sharp had made drawings not having been executed, partly owing to the delay in getting them engraved, and partly because of the great expense involved. However, the work was published, much to the relief of the editors, who, as the crowning event of their labours, seem to have been brought face to face, probably for the first time, when Crosthwait visited Abraham Sharp at Horton, as may be gathered from the following letter written by Crosthwait:—

GREENWICH, November 20th, 1725.

SIR,

I return you my hearty thanks for your kindness and civility at Horton, which I shall always gratefully remember. I should sooner have made my acknowledgments, but have waited for the proof of the

maps now in hand ; but as they are not yet finished, I would not delay any longer. However, I have procured you Bishop Burnett's History of his Own Times, in three volumes octavo, for 7s. 6d., which I sent by the Bradford carrier, directed as usual, on Thursday last. In my absence they have agreed to sell the three volumes [of the *Historia Celestis*] at 5gs. instead of 8gs., and they now wish they had taken my advice. The Dutch were going to reprint the whole had not the price been reduced, but I believe now it will scarce be worth their while.

Your much obliged humble servant,

JOS. CROSTHWAIT.

The following letter, and others subsequently, were addressed "For Mr. Abra. Sharp, at Little Horton, to be left with Mr. Thos. Swain, salter, in Bradford, Yorkshire":—

GREENWICH, *March 12th, 1726.*

SIR,

I received the favor of yours of the 15th February, and the week following the map and the quadrant, both safe and in good order, for which I return you my hearty thanks, having nothing besides in my power to give in return. The quadrant is the most curious piece of workmanship I ever saw, as well as the most useful. The use of it will always put me in mind of the donor, for whose sake it shall be carefully preserved during my life. I know little or nothing of Dr. Halley except that he, underhand, hinders the sale of Mr. Flamsteed's books as much as he can ; but this is no more than what I expected. I am informed by one whom he took for a friend that he is very angry with me, and says he never expected they would have been published, and, being disappointed in this, I presume he will spend the remainder of his time in endeavouring to find faults. There is a new edition of Sir Isaac's *Principia* coming out by a gentleman of Cambridge,

I have nothing more to add, but since you are not pleased to accept of Bishop Burnett's History I shall call upon Mr. Sprint next week when I send the maps, and am

Your most obliged and humble servant,

JOS. CROSTHWAIT.

The annexed epistle, the last which Crosthwait wrote to Abraham Sharp, or, probably more correctly speaking, the last one which has been preserved, tells its own story. It is indeed a remarkable contribution to a narrative of disappointment and ingratitude. It will be observed that the letter is

dated five years after the *Historia Cælestis* was completed and published, and eleven years after the death of Flamsteed :

GREENWICH, August 29th, 1730.

SIR,

It is now a long time since I did myself the pleasure to write to Mr. Sharp. The only reason and excuse I can make is that I have met with nothing to communicate worthy either your expense or trouble. I hear of nothing new in mathematics. Dr. Halley, Mr. Machin, and Mr. Whiston are all endeavouring to find longitude in order to obtain the £20,000.

You and I have labored for Mrs. Flamsteed for above ten years, and our reward, so often promised, is at last befallen us. Mrs. Flamsteed died the 29th ultimo, and has given Mr. Hodgson's son (a few legacies excepted) all from her own relations, and to you nor I not one farthing. For all my time spent and all my own expenses in attending the printing and maps, I never had any allowance ; besides losing of two places which were offered me—one in the Ordnance, of £80 per annum, which I refused at her request in order to help to complete Mr. Flamsteed's works. What has induced her to act so dishonestly by us at last, except it was that she had no further occasion, I cannot apprehend. Could Mr. Flamsteed have foreseen her ingratitude I am confident he would not have left it in her power ; neither should you nor I, for we ought to have made a bargain with her first, but 'tis now too late. Young Hodgson informs me he has a ring at your service. If you please to accept of it, let me know to whom you would have it delivered, and it shall be given to the person by,

Sir, your most obliged servant,

JOSEPH CROSTHWAIT.

This, then, was the recompense which Sharp and Crosthwait received for all their years of labour resulting in the final publication of the *Historia Cælestis*. Flamsteed, during his lifetime, was most profuse in his acknowledgments of the valuable services rendered by his former assistant, and in one of the last letters he wrote to him remarked—"I shall not be, nor ever have been, sparing in remembering your performances. I have already in the preface to my Catalogue given the world an account how well you fitted up and divided the mural arc, and what share you had in the calculations of the moon's and planets' places, for I esteem your work the highest piece of ingenuity, as well as pro-

ficiency." Fortunately, Abraham Sharp had a soul above pecuniary recompense. On one occasion only, so far as we have any record, viz., in 1705, he received a sum of ten guineas from Flamsteed, and in acknowledging its receipt, Sharp wrote—"What you offer exceeds my expectations. I never desired anything of that nature, had it not been more for the satisfaction of my friends than myself." In a very pressing letter, in which he entreated Mr. Sharp to continue his good offices in bringing to completion Flamsteed's work, Crosthwait wrote—"It will be impossible to get the rest of the charts of the constellations without you undertake the thing, for I do assure you not one person upon earth has given the least assistance to the work beside yourself, for which Mrs. Flamsteed is willing to gratify you to the utmost in whatever way you shall choose."

In response to these pressing requests Abraham Sharp not only drew the lines and the divisions of all the maps of the Constellations, but wrote the accompanying descriptions, and laid down the stars. In June, 1722, Crosthwait again wrote—

I return you my most humble and hearty thanks for the offer you are pleased to make of drawing the planispheres upon metal. 'Tis what I have often thought of and wished for, and if you will venture upon them I will bear the expense of the metal, and whatever advantage is made shall be at your disposal.

Notwithstanding all the years of labour by head and hand which Abraham Sharp gave to the compilation and completion of the *Historia Cælestis*, and through its publication to astronomical science, there is not the remotest reference to him in the dedication to His Majesty the King, signed by Flamsteed's widow and James Hodgson, the nominal editors.* There is a profuse laudation of the skill

* Mr. Hodgson was formerly Flamsteed's assistant at the Observatory, and in consequence of his marriage with Flamsteed's niece his family eventually inherited a great portion of his property.

and attainments of Mr. Flamsteed, and of his loyal devotion to His Majesty's person and the interests of the Protestant Succession, but neither Sharp nor Crosthwait are acknowledged in any way.

The *Historia Cœlestis Britannica* is in 3 vols., and is dedicated to His Majesty King George I. by Margaret Flamsteed, widow, and James Hodgson. The preface is signed by Francis Roberts, Christopher Wren, Isaac Newton, David Gregory, and John Arbuthnot. It is dated London, 1725. The work contains an excellent portrait of John Flamsteed, engraved by Vertue, which, by permission of the President of the Royal Society, we have been privileged to reproduce. The *Historia Cœlestis* contains a complete account of the instruments and the methods employed, together with a large mass of sidereal, lunar, and planetary observations, and the British Catalogue of Fixed Stars. This work, indeed, occupies the same place in practical astronomy which the *Principia* of Newton holds in the theoretical part.

The following extract from Flamsteed's preface, communicated in a letter to Abraham Sharp by Crosthwait, is of sufficient interest to justify its finding a place here. After a long introduction, dealing with the theories of the early astronomers down to his own period, Flamsteed continues :—

Having thus given the history of my observations of the fixed stars, and shewed both what the true obliquity of the Ecliptic or the inclination of the earth's axis, as the asserter of her motion would rather call it, and also how I determined the inequality of the earth's motion and the true places of some of the principal stars, and from them of all the rest inserted in it, I shall next give an account of such variations as may be caused in their right ascensions and distances from the visible pole by the parallax of the earth's orb.

From my first year's observations of the pole stars' meridional distances from our vertex I suspected that the parallax was sensible,—some observations I had taken with the sextant of the intermutual

distances of bright fixed stars had caused me to suspect it before ; for I found that I had them at some times of the year a little bigger than at others. But the sextant being an unfixed instrument that required two persons to make use of it, and the air being changeable and different at different times of the year, and consequently the distances being more or less contracted by refractions according to the greater or lesser density of the air, or greater or less inclination of the plane through the two observed stars to the vertical circles following upon them, it was very difficult to make good conclusions from them. Continuing, therefore, my observations annually of the pole star, I find always a small but sensible difference betwixt those I took in September and the following months of each year, which argued a sensible parallax of that star. At that time Mr. John Casswell, the Savillian professor of astronomy at Oxford, with whom I had been acquainted from 1680, kept a friendly correspondence with me. In one of my letters to him I gave him some account of these observations, and what I deduced from them. This letter he showed to Dr. Wallis, who was then printing an edition of his works in folio, and writing to me he earnestly pressed for a larger account of these observations, which I soon drew up and sent him, and he printed my letter, which was dated December 22nd, 1698. This was the first time that anything appeared in public of this subject, and therefore the French (who have boasted by the pen of Mons. Fountenel, their secretary, that the world is indebted to them for all the curious discoveries of the last productive century, or they have found the way to making all the inventions of it their own) found fault with my demonstration of it ; and Cassini, junr., published something about it in the preface to the "*Historia de l'Academy des Sciences*" for the year 1699, which caused me to consider that subject anew, and in the year 1702, on the 22nd November, I wrote a letter concerning it, wherein I expounded my views.

A concise description of the contents of Flamsteed's work is contained in a letter written by Crosthwait to Sharp, dated December 28th, 1721. It was written in anticipation of the publication of the *Historia Cœlestis*, and was prefaced by the remark :—"In order to apprise the world of what it may expect of Mr. Flamsteed, I have drawn up the under-written account of his works, which if you approve of I shall immediately get it printed in some of the most reputable of our public papers" :—

The first volume contains the observations of Mr. William Gascoigne (the first inventor of the way of measuring angles in the telescope by the help of screws, and the first that applied telescopical sights to astronomical

instruments), taken at Middleton, near Leeds, in Yorkshire, betwixt the years 1638 and 1643, excerpted from his letters to Mr. Crabtree, with some of Mr. Crabtree's observations of the same years, as also observations of the sun and moon's diameters, configurations and elongations of Jupiter's satellites from him; small distances of fixed stars, with appulies of the moon and planets to them, observed with the telescope and micrometer at Derby by Mr. Flamsteed betwixt the years 1670 and 1675, with the larger intermutual distances of fixed stars, and of the planets from them; eclipses of the sun, moon, and Jupiter's satellites; spots on the sun; comets, and reflections taken with a sextant of near 7ft. radius, a voluble quadrant, and the above-mentioned instruments, betwixt the years 1675 and 1689, at His Majesty's Observatory, ranked under proper heads. And subjoined the places of the moon, Saturn, Jupiter, Mars, Venus, and Mercury deduced from the observations, and also very necessary tables to be used with them.

The second volume contains his observations made with the mural arc of near 7ft. radius and 140 degrees in the limb of the meridional zenith, distances of the fixed stars, sun, moon, and the other planets, with the times of their transits over the meridian, together with observations of the sun and moon's diameters, eclipses of the sun, moon, and of Jupiter's satellites, variations of the compass, &c.; tables serving to render the calculations of the stars and planets' places from the observations easy and expeditious. To this volume is added near 1000 places of the moon at the oppositions, quadratures, and on her limbs, &c., with the places of Saturn, Jupiter, Mars, Venus, and Mercury derived from the above-mentioned observations.

The third volume contains a catalogue of the right ascensions, distances from the pole, longitudes, latitudes, and magnitudes of above 3000 fixed stars, with their variations of the right ascensions and polar distances whilst they change their longitudes one degree, whereby their right ascensions and distances from the pole may be determined for 200 years past, or to come sufficiently exact. Large tables, by which, the right ascensions from the pole of the stars and planets being given, their longitudes and latitudes may be found by inspection. To this volume is prefixed a very large preface, containing an account of all the astronomical observations made before his own time, with a description of the instruments made use of, as also an account of his own observations and instruments, together with Ptolemy's catalogue of 1026 fixed stars, and Ulugh Beigh's places annexed on the Latin page, with the corrections; small catalogues of the Arabs; Tycho Brahe's of 780 fixed stars in the proper order; Hevelius's of 1534; a small catalogue of Mr. Flamsteed to the year 1686; Dr. Halley's catalogue of about 300 of the southern fixed stars, calculated anew from his distances and Mr. Flamsteed's stars' places. To this volume will speedily be added tables of the sun's places and declinations for the four first years of this century, and variations to make them serve for the whole, and also twenty-five large charts, each being near 2ft. 3in. broad

and 20in. deep, which take in all the constellations visible in our hemisphere according to a new method of Mr. Flamsteed's, done from his catalogue, wherein the ancient figures are restored. To this volume will likewise be added two general maps of both the northern and southern hemispheres.

The important part played by Abraham Sharp in connection with the publication of the *Historia Cœlestis* appeared to call for a somewhat ample notice of this now very scarce work. That duty discharged, any further mention of it and of the controversy which it called forth may now be only incidentally made. Into the discussion opened up by Baily in his "Life of Flamsteed" we do not propose to enter. The publication of that volume speedily called forth champions of Sir Isaac Newton and those acting with him upon the famed revision committee, Dr. Whewell among others, and in 1837, about two years after the publication of the first edition of his work, Baily followed with a supplement, in which he deprecated the attempt made to magnify the failings of Flamsteed, and to make light of the obstruction which (under whatever other name it might be called) Baily still maintained had been offered to Flamsteed in the prosecution of the work of his life. Baily undoubtedly took the Flamsteedian side of the quarrel; Sir David Brewster, in his "Memoirs of Sir Isaac Newton," gave the Newtonian side. The latter work, however, was not published until ten years after Baily died, and hence the allegations and counter-statements were never replied to.



ABRAHAM SHARP.

CHAPTER V.

Abraham Sharp's life at Horton—His youthful devotion to the science of astronomy—Had no sympathy with astrology—His charitable disposition—His gifts to pious and charitable purposes—His careful habits—His mathematical accuracy—Description of Horton Hall—Remains of the old timber-built house—Drawing of the structure—Sharp's study and observatory—Novel mode of admitting visitors—Sharp's recluse habits—Rev. Oliver Heywood at Horton Hall—Sundial, engraved by Sharp, found at Meanwood—The Priestley family—Sharp's mechanical genius—His attempt at "squaring the circle"—Sharp works out the problem to seventy-two places—Van Ceulen's attempt compared—He also improves the system of logarithms—His contributions to Sherwin's Mathematical Tables—Henry Briggs, Savilian professor of geometry at Oxford—Jesse Ramsden, mathematical instrument maker—Anecdote of Sir John Herschel—Sharp's "Geometry Improved"—Correspondence relating to it.

Abraham Sharp's life at Horton was evidently one of devotion to the twin sciences of astronomy and mathematics. The bent of his mind towards philosophic research was such that, during a life protracted beyond the usual length (for he lived to be a nonagenarian), nothing could divert him from those pursuits. Of astronomy he was a truly devoted student. From early youth, as we have seen, he was absorbed in its pursuits. To that must be added his marvellous skill in mechanism. At Horton Old Hall is preserved a portrait of the youthful astronomer, having in his hands a quadrant, which is apparently an object of his especial admiration. It was probably the exercise he obtained in hard mechanical work that tended in a great degree to the longevity of his life, otherwise the

severe studies he engaged in must have had an injurious effect. Abraham Sharp not only possessed a remarkably clear head for contriving, but an extraordinary hand for the execution of mechanical apparatus of a minute description, while his skill in penmanship, and in drawing beautiful lines, figures, or geometrical constructions, was equally remarkable for beauty and elegance.

In pursuing the noble science of astronomy, Abraham Sharp despised what was commonly called judicial astrology. To him it appeared ridiculous to expect the fate of empires, of states, or individuals to be determined by the different aspects of the stars, or of any combination of them. His study of the celestial bodies was based upon a profound reverence for the mysteries of creation, for he was pre-eminently a religious man. Endowed with great comprehensiveness of mind, he rose above the tribe of ephemerists who in his day preyed upon the credulity of weak humanity, and with humility, diligence, and devotion contemplated the heavens with a sublimer purpose. A bachelor to the end of his days, he was wedded to astronomical research, and found in it both employment and happiness.

Judging by his correspondence and other evidences, Abraham Sharp was neither a religious nor a political bigot. He lived in times of unwonted activity and even of great excitement. Born during the eventful period following the Civil Wars, the year of the Revolution found him an assistant to Flamsteed, absorbed in the erection of the mural arc. He passed through the troublous times culminating in the Treaty of Utrecht, and was at Horton during the attempt in 1715 to restore the Stuart family, when, like other peaceful subjects, he was much disturbed in his studies by the general disorder which prevailed. Abraham Sharp was both a loyal and a pious man, and charitable to a degree that will never be fully estimated. In his memorandum books, still existing, pages are taken up with

items under the head "Disburst to piety and charity," or, "Cash for pious and charitable uses." It was only in accord with the habit of his life, however, that he kept account of such items in his expenditure, and not by any means for ostentatious display. The entries alluded to are many of them of a curious character. Here is one showing how Mr. Sharp's generosity had been stimulated by his passion for mathematics. Under date February, 1704, we find—

Given a poor sick man that told me he
knew navigation £1 11 0

This poor mendicant must have appealed with especial force to his generosity, as the generality of Mr. Sharp's benefactions were of much smaller sums. In almost every transaction where his talents and spare capital brought him increased gain, a tenth of the amount he received was set aside for pious or charitable purposes. Thus, in 1705, appear the items:—

Deo (to God) out of the 40s. received of the	
Court of Exchequer	£0 4 0
Deo out of the interest of £9 7s. 6d. ...	1 0 0
Deo out of the profits of ye cane and dyall	
made for Sir John Armitage	0 2 6
To piety out of interest	1 15 0

Abraham Sharp's charitable disposition was so well known, and probably unduly taken advantage of, that it is said the road from his house at Horton to the place of worship he attended was frequented by his indigent neighbours, to whom he distributed alms in a peculiar way. He generally took care to have plenty of halfpence in his pockets, and these coins he suffered to be taken out of his hands held behind him, without asking questions, or even looking back to note who were the recipients.

Of his religious convictions it is not within our province

to speak, but, after the manner of the Covenanters, it was his custom to renew every birthday the formal dedication of himself to God which he had prepared, and a copy of this dedication is in the possession of a member of the Sharp family. He was a strict Presbyterian, and a regular attendant at the services of the Nonconformists, first at Horton and afterwards at Bradford, but he kept his pew at the Bradford Parish Church, and while leaning towards Dissenting ministers in the neighbourhood, was apparently on the best of terms with his Episcopal neighbours. The Rev. Oliver Heywood the ejected clergyman of Coley Chapel, near Halifax, was a regular visitor at Horton Hall, a large room in which was licensed for preaching by the Rev. Thomas Sharp, Abraham's eldest brother, soon after his ejection from Adel, and Heywood kept up his visits until his death.

In appearance Abraham Sharp has been described as of middle stature, and very spare of body. The great age to which he lived scarcely justifies the statement that has been repeatedly published that he was of a weakly constitution. He was undoubtedly of an active temperament, and although at times so absorbed in mental calculations demanding an absolute freedom from disturbance, the entries in his memorandum books show him to have been full of the business of everyday life, and almost necessarily in daily communication with those around him. For many years he had the entire management of the family estate at Horton and elsewhere, and not only acted as steward but also as lawyer, so far as in the execution of deeds and indentures, &c., several of which we have before us written in his peculiar handwriting. Soon after taking up his residence at his ancestral home at Horton, viz., in 1694, he styled himself "Accomptant." Mr. Sharp even found time for teaching or giving lessons in mathematics. Having surplus money of his own Mr. Sharp lent sums repeatedly on mortgage or bond, always taking care to retain a note of

hand as security, and rendering out of the interest a certain proportion to charitable uses. With all this surplus wealth at his disposal he appears to have been singularly careful in his habits. Under date 1695, soon after the death of his brother, the Rev. Thomas Sharp (of whom more anon), there appear these items:—

Paid for waistcoat and breeches of my					
brother's (made to fit)	£	o	2	4	
William Gill, for turning my rat-eaten coat...		o	3	6	
A pair of grey worsted stockings		o	3	6	
Ben. Taylor, making one coat out of my					
great coat		o	8	o	

Nevertheless, he observed the proprieties of his station in life by apparently having in readiness the requisite attire of a gentleman of the period. Thus among his items of expenditure we find the following, among others:—

A hat, called a dockray hat, and band ...	£	o	11	4	
James Wray, for a wig		o	19	o	
Powder for wigs... ..		o	1	4	
Powder for hair		o	o	6	
Gloves and tying cravat		o	5	6	

It has been previously stated that Mr. Sharp paid for his board, as appears by frequent references to sums paid at periodical reckonings (see pages 26 and 156-7). Although undoubtedly a temperate man, he apparently kept a little wine "for his stomach's sake," as well as other creature comforts.

The entries in Abraham Sharp's memorandum books afford such an insight into the daily habits and avocations of the man, that we cannot do better than give a selection taken almost at random, extending from the time of his taking up his residence at Horton until a few years before his decease. It will be found that the selection forms a curious medley of items relating to rents, loans, household expenses, postage, carriage and cost of books, also disburse-

ments on account of charity, besides many other items, namely :—

1694—Reckoned with sister for my board ...	...	£5 17 0
1695—Pd Mr Richardson* for suing on Baldwin's bond ...	...	0 10 0
Letter from Mr. Halley ...	...	0 0 7
1698—Robt Stansfield† for rape oyle ...	...	0 4 0
A neckcloth of T. Farrand ...	...	0 4 0
1704—For collection at chapel,‡ Mr. Priestley ...	...	0 1 0
Pd to Mr. Flamsteed by micrometer ...	...	1 6 9
Dr. Bate's Harmony of Divine Attributes ...	...	0 4 4
Letter from Mr. Flamsteed ...	...	0 0 7
1705—Joshua Bartlett|| for binding 4 volumes of Voyages ...	...	0 3 2
2 quarts of sack to Robert Stansfield ...	...	0 5 0
Letter from Mr. Raphson ...	...	0 0 6
Received of Mr. Flamsteed ...	...	10 15 0
1706—For Mr. Flamsteed a 1000 quills ...	...	0 4 6
Wm Banks for a silver chain for my watch	...	0 6 6
Jos. Myers for making grey coat and breeches	...	0 12 8
A glass pen ...	...	0 0 6
1708—Lent Joshua and Benj. Bartlett on their bond	...	50 0 0
Chris. Swain for land tax ...	...	0 2 5
Lent Mr. Waterhouse§ upon note ...	...	18 0 0
1710—June 6. Expenses of Sister's Funeral¶ ...	...	40 0 0
To Mr. Dawson preaching Sis fun' sermon...	...	1 1 6
To Mr. Priestley do. do. ...	...	1 1 6
Given to Little Horton people who had not gloves ...	...	1 16 3
Lent Sarah to pay James Gray for bleeding	...	0 0 6
Rd of Mr. Lister, schoolmaster, for teaching	...	3 7 0
1711—Lent Josh. and Benj. Bartlett on bond ...	...	60 0 0
Paid Coz. Robert for my table ...	...	8 0 0
1712—Uncle David Clarkson's** Sermons in quires	...	0 8 0
1714—Two sheets parchment for conveyances ...	...	0 6 7
5 yards of cloth of John Dawson ...	...	2 10 0

* Lawyer Richardson, of Birkshall, who married a sister of Archbishop Sharp.

† Robt. Stansfield, who married Mr. Sharp's niece, was a drysalter in Bradford.

‡ See subsequent reference to Horton Chapel.

|| See note on the Bartletts on p. 67.

§ The Rev. Jonas Waterhouse sprung from the Waterhouses of Halifax, who had settled at Tooting, in Surrey, and held the vicarage of Bradford in 1657. He refused to conform in 1662, and was ejected from the living, but still continued to reside at Bradford, and occasionally ministered privately. He was on very intimate terms with Abraham Sharp's family, who were equally zealous Nonconformists, and in his will Abraham Sharp was made supervisor.

¶ Faith, the wife of the Rev. Thos. Sharp.

** See notes on the Clarkson family.

1714—Given Martha for a fairing	£0	1	0
1715—Letter from B. Bartlett... ..	0	0	7
Pd my cozen for my table from August ...	7	0	0
1725—Pd Mr. Sawrey for table	10	0	0
Lent Mr. Sawrey upon note	150	0	0
Cherry brandy	1	0	0
Pd Benj. Bartlett for Dr. Burnett's History	0	6	0
Divine Yearnings	0	4	6
Land tax	0	4	10
Letter from Mr. Flamsteed	0	0	5
1726—Mending old walking coat	0	0	9
Soleing shoes	0	1	3
Philosophical Transactions	0	2	0
Lent Joshua Bartlett, for which he left Le			
Brun's Travels in pawn	0	14	0
1729—Half cask brandy	2	8	0
Pd Sarah Bartlett for Leeds News	0	0	2
1732—Disbursements for piety	2	16	2
Cherry brandy	0	6	0
1734—Letter to Jos. Crosthwaite	0	0	4
Thucydides	0	5	6
Binding Transactions	0	6	0
Oxford Almanac... ..	0	0	6

During the whole of the period covered by these memoranda, Abraham Sharp was engaged in solving the most difficult mathematical problems of the day, and in taking daily and nightly observations of the heavens, all the while keeping up a correspondence with Flamsteed, Dr. Halley, Dr. Wallis, Hodgson, Sherwin, and others, who were equally deep in astronomical subjects, his advice on these matters being also sought by smaller lights, with whom he also corresponded. The accuracy with which he worked out problems submitted to him was so remarkable that one of his editors calls him "the incomparable Mr. Sharp," and adds that "his tables are sufficient to represent the circumference of the globe of the earth so truly as not to err the breadth of a grain of sand in the whole!" A specimen is given in *fac-simile* of one description of his calculations, but by no means so minutely rendered as others which might have served for illustration.

There is a story current of Mr. Sharp that on one occasion, not being able to solve a mathematical problem he was intent upon, and having heard that some person in Scotland was clever at such studies, he made the journey thither to see him. Finding out the object of his search, he narrated his errand, when he was told that there was only one man who could help him, and that he had better seek him out. Sharp asked who it was, when the Scotchman, in perfect ignorance as to the name of his visitor, said that his name was Abraham Sharp, and that he lived at Little Horton, near Bradford!

Mr. Sharp was also engaged in contriving, adapting, and fitting up astronomical and mathematical apparatus, constructing curious engines for turning all kinds of work in wood and brass, and making with his own hands the lathes, tools, &c., with which these were wrought. The tower from which he watched the heavenly bodies; the room where he worked out his calculations; and the workshop where his lathes were fixed, and where most of his apparatus was contrived, still remain at Horton Hall, Bradford, an exterior view of which is given as a frontispiece, as well as a drawing showing the appearance of the hall as it was in Abraham Sharp's time. Horton Hall afterwards became the residence of Charles Swaine Booth Sharp, Esq., who in 1769 married Hannah Gilpin, to whom the property had descended on Mrs. Sawrey's decease. That gentleman added a modern building to the old hall, thereby depriving it of its eastern wing. He died in 1805. The hall afterwards became the residence of Mrs. Giles, who succeeded to the property; and it was let to Mr. Saml. Hailstone in 1835. After the death of his father, in 1851, Mr. Edward Hailstone continued the occupation until the year 1870, when he removed to Walton Hall, near Wakefield.

In archæological circles in the north of England Mr. Hailstone is well known as a virtuoso; his collection of books,

124605	124606	124607	124608	124609	124610	124611	124612	124613	124614	124615	124616	124617	124618	124619	124620	124621	124622	124623	124624	124625	124626	124627	124628	124629	124630	124631	124632	124633	124634	124635	124636	124637	124638	124639	124640	124641	124642	124643	124644	124645	124646	124647	124648	124649	124650	124651	124652	124653	124654	124655	124656	124657	124658	124659	124660	124661	124662	124663	124664	124665	124666	124667	124668	124669	124670	124671	124672	124673	124674	124675	124676	124677	124678	124679	124680	124681	124682	124683	124684	124685	124686	124687	124688	124689	124690	124691	124692	124693	124694	124695	124696	124697	124698	124699	124700	124701	124702	124703	124704	124705	124706	124707	124708	124709	124710	124711	124712	124713	124714	124715	124716	124717	124718	124719	124720	124721	124722	124723	124724	124725	124726	124727	124728	124729	124730	124731	124732	124733	124734	124735	124736	124737	124738	124739	124740	124741	124742	124743	124744	124745	124746	124747	124748	124749	124750	124751	124752	124753	124754	124755	124756	124757	124758	124759	124760	124761	124762	124763	124764	124765	124766	124767	124768	124769	124770	124771	124772	124773	124774	124775	124776	124777	124778	124779	124780	124781	124782	124783	124784	124785	124786	124787	124788	124789	124790	124791	124792	124793	124794	124795	124796	124797	124798	124799	124800	124801	124802	124803	124804	124805	124806	124807	124808	124809	124810	124811	124812	124813	124814	124815	124816	124817	124818	124819	124820	124821	124822	124823	124824	124825	124826	124827	124828	124829	124830	124831	124832	124833	124834	124835	124836	124837	124838	124839	124840	124841	124842	124843	124844	124845	124846	124847	124848	124849	124850	124851	124852	124853	124854	124855	124856	124857	124858	124859	124860	124861	124862	124863	124864	124865	124866	124867	124868	124869	124870	124871	124872	124873	124874	124875	124876	124877	124878	124879	124880	124881	124882	124883	124884	124885	124886	124887	124888	124889	124890	124891	124892	124893	124894	124895	124896	124897	124898	124899	124900	124901	124902	124903	124904	124905	124906	124907	124908	124909	124910	124911	124912	124913	124914	124915	124916	124917	124918	124919	124920	124921	124922	124923	124924	124925	124926	124927	124928	124929	124930	124931	124932	124933	124934	124935	124936	124937	124938	124939	124940	124941	124942	124943	124944	124945	124946	124947	124948	124949	124950	124951	124952	124953	124954	124955	124956	124957	124958	124959	124960	124961	124962	124963	124964	124965	124966	124967	124968	124969	124970	124971	124972	124973	124974	124975	124976	124977	124978	124979	124980	124981	124982	124983	124984	124985	124986	124987	124988	124989	124990	124991	124992	124993	124994	124995	124996	124997	124998	124999	125000
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

SPECIMEN OF ABRAHAM SHARP'S CALCULATIONS.

engravings, ancient manuscripts, old glass, ceramics, and objects of art and *virtu* being one of the most valuable in the north of England. To that gentleman, in an especial degree, is due the preservation of many manuscripts and relics of Abraham Sharp, which, but for the zeal with which he succeeded in recovering many of these, would have been lost. Mr. Hailstone has secured every scrap of Sharp evidences he could meet with during many years, and his estimation of the great abilities of the former occupant of Horton Hall amounts almost to reverence. His collection of Sharp relics includes several pocket books of the personal accounts and private memoranda of the astronomer; an account book setting forth his personal expenditure from the year 1693 to the year 1734, together with scientific memoranda, and an inventory of his instruments, subsequently referred to, besides examples of Sharp's handiwork in rose and oval work, calculating instruments, his walking-cane fitted up as a telescope, &c. Sharp's catalogue of daily observations contains marvellous specimens of his minute and excellent penmanship. Unfortunately many of the celebrated mathematician's papers and astronomical memoranda are irrecoverably lost, and hence the life-story of a worthy and a talented Yorkshireman cannot be fully told.

In the year 1871 Horton Hall and grounds were purchased from Mrs. Giles's trustees by Francis Sharp Powell, Esq., M.P., of Horton Old Hall, the seat of one branch of the Sharp family. As the two estates adjoin, they have again become one property, as was the case probably two hundred and fifty years ago. The hall is now the residence of Ezra Waugh Hammond, Esq., during whose occupancy many appropriate and valuable additions have been made in oil paintings, oak furniture, &c.

So far as Horton Hall remains intact, it is a fair specimen of an Elizabethan residence of one of the smaller gentry, such, indeed, as abound in the neighbourhood of

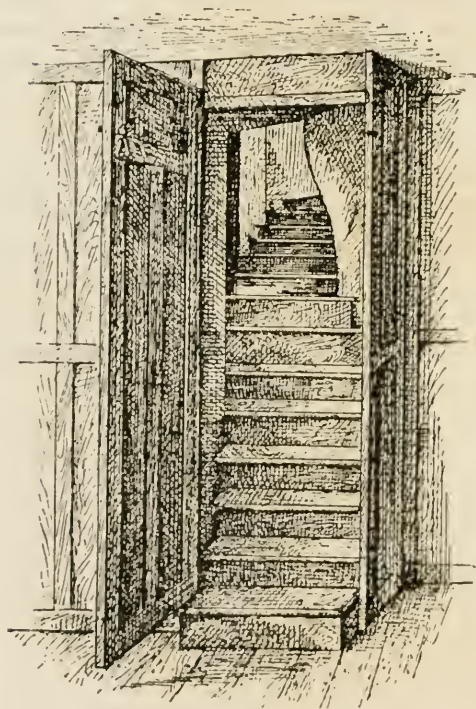
Bradford. The present building dates from the year 1678, when its erection was completed by the Rev. Thomas Sharp, the astronomer's brother. The plan drawn by Mr. Sharp, showing how he made use of the shell of the old house for the larger and more pretentious dwelling, is in the possession of Mr. F. S. Powell, having been presented to that gentleman by Mr. Hailstone, who found it trampled under foot in an outhouse upon his taking possession of Horton Hall.

An inspection of the interesting building referred to shows how the original timber-built house was added to the newer erection, the former having probably existed from about the middle of the fourteenth century. The old structure, judging by the appearance of the timbers now visible as inside walls, was about six crooks in length, a "crook" representing the span of the original roof timbers. That portion of the building to the north is very low and quaint in appearance. Although now thrown into one room, it was originally two apartments with a passage between leading directly to the front or tower entrance. On one side was the "Tinello," or servants' hall.* The ceiling of this part of the hall and that of the reception rooms is evidently of later date than that which witnessed the remodelling of the building, but there is much oak wainscoting and many panelled doors of an earlier date. The rooms to the front of the hall are much loftier than those at the back, and were those used by the Rev. Thomas Sharp and his family, and afterwards by Abraham Sharp. They are lighted by large mullioned windows, the small panes of which have since been replaced by modern glass. In the window of the room forming the western wing, the initials T S, being those of the builder, were scratched on the stone work. The windows have a southern aspect, and now look out upon

* See "Rambles Round Horton," p. 100.

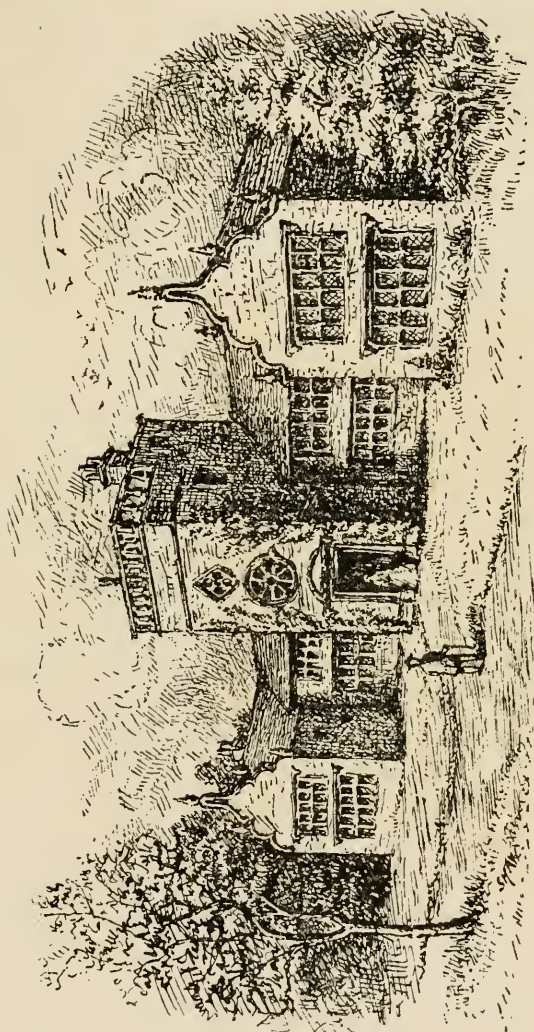
All Saints' Church, a magnificent edifice built at the sole cost of Mr. F. S. Powell.

The square tower shown in the sketch is a picturesque object, and is rendered somewhat unique by possessing a circular window in eight divisions, with a smaller window of lozenge shape above it. It was from the roof of this tower that Abraham Sharp made his observations of the heavens, although, as his correspondence shows, he occasionally used the limbs of an apple tree as a rest for his telescope. This



tower formed part of the structure built by the Rev. Thomas Sharp, and is quite in keeping with many of the houses of that date to be found in the West Riding. At the period of its erection the roof of the tower would afford an uninterrupted view of the surrounding locality, with the little market town of Bradford nestling in the valley beneath. The panorama must have been of a pleasing character, but very different to that which now meets the eye.

Abraham Sharp's study also remains, but so altered in its internal arrangements as to appear little like the original. It was in an upper room on the first floor. A small window



HORTON HALL AS IT WAS.

afforded light to a small oaken desk, which was said to be worn into cavities by the rubbing of Sharp's elbows upon it. Upon the side of the room opposite the window were the bookshelves containing the books forming his library, which, judging by an inventory existing, was very extensive. A railing passed round two sides of the room for the better security of the books. In a corner of the room was the staircase leading to Sharp's watch tower or observatory, the panelled oak wainscoting and door being evidently of ancient date (see sketch). The door leading to the study was in another corner, and was approached by three steps.

According to tradition, the astronomer and mathematician was so retiring in his habits that strangers were not admitted to his sanctum, and not even his own domestics were admitted to bring him his meals, but, in order to prevent any interruption of this character, he had a sliding panel made in a cavity near the entrance to the room, where his meals were brought and placed. It is also affirmed that he was often so absorbed in his calculations as to be oblivious to the calls of hunger, and that frequently the provisions brought for his use were found to have accumulated for a day at a time.

It is probable that Mr. Sharp found few congenial spirits in the neighbourhood of Horton with whom he could hold converse on abstruse subjects. Towards the close of his correspondence with Flamsteed he complained that he could find no one whom he could instruct in the use of the instruments he used. There were, however, exceptions in the list of prohibited visitors, who were welcome to his study, the one being a mathematician (a Mr. Dawson), the other an apothecary (Dr. Swaine). Even the manner of their admittance was singular; savouring rather of the dark ages than the eighteenth century, namely, by one of the visitors rubbing a stone against the outside of Mr. Sharp's chamber door! This was the magic sound which produced the "Open

Sesame!" and if the anchorite was in a mood for company the friends were admitted.

Dr. Swaine resided in the Hall Ings, at Bradford, and was a member of a very ancient family settled at Horton as early as the beginning of the sixteenth century, and which afterwards became very numerous and substantial. The head of the family in England is now H. P. Swaine, Esq., of Brabœuf Manor, Guildford. The Mr. Dawson mentioned would probably be the Rev. Eli Dawson, son of the Rev. Joseph Dawson, ejected from Thornton Chapel by the Act of Uniformity. He was a frequent preacher at the Presbyterian Chapel, Bradford, of which Abraham Sharp was a regular attendant and a trustee. Ralph Thoresby, the author of the "*Ducatus Leodiensis, or Topography of Leeds*," was an occasional and, probably, a welcome visitor, but although the town of Leeds, where he resided, is only distant nine miles from Horton, it was sufficiently far away to keep the friends apart. In Thoresby's diary, under date July 1, 1703, appears the entry:—

Rode with nephew Wilson and Mr. Hall to visit Dr. Sharp, of Horton, and the famous mathematician, his uncle Abraham, who showed us some curious instruments and most ingenious contrivances of his own invention. Was pleased with the sight of some original letters of Mr. Flamsteed and Mr. Halley to him.

Dr. Richardson, of Bierley, would probably also be an occasional visitor to Abraham Sharp, although the tastes of the two *savans* were somewhat dissimilar. During his lifetime, the Rev. Oliver Heywood was a frequent visitor at Horton Hall, as is recorded in his diary, but he died in 1702, and therefore Mr. Sharp could only have enjoyed his conversation on religious topics some eight years after finally settling at Horton.

The Rev. Nathaniel Priestley, of Ovenden, was another intimate friend of the Horton astronomer. He was an eminent Nonconformist minister, and preached at Bradford

and Halifax alternately with Mr. Eli Dawson for many years. Mr. Priestley was one of three young ministers who in 1694 were ordained at Horton Chapel by the Rev. Oliver Heywood, the candidates having first been examined at Mr. Sharp's house. He married Jane, the widow of a gentleman named Fourness, by whom he had three sons, viz., Jonathan, Thomas, and Nathaniel, and several daughters. The Rev. Nathaniel Priestley died in 1728. His eldest son, Jonathan,

inherited his father's estate, in addition to that of his uncle, and had a son, Henry, living at Leeds in 1781, upon an estate of £200 per annum. This brief narrative is interesting, assisting as it does to an explanation of the fact that a sun dial, beautifully engraved by Abraham Sharp, has recently been discovered at Meanwood, near Leeds, and now forms an interesting object in the grounds of Walter Rowley, Esq., F.G.S., of Alder Hill. A sketch of the dial and pedestal is appended, from a photograph furnished by Mr.



Frank Kidson, of Leeds, but it necessarily conveys no impression of the beauty of the workmanship found upon the surface of the plate. Upon the polished surface is the inscription—

Fugit Hora: Ora, Labora.

Nath. Priestley, calculavit.

Abr. Sharp, delineavit.

Latit 55—15.

1722.

The intimacy between the two persons named is fully attested by numerous references to loans of books and instruments found in Abraham Sharp's memorandum books, covering a number of years. Thus, under date June 8th, 1711, is an entry—

Lent Mr. Priestley 12 vols. of Uncle Gilbert's "Manuscript Sermons."

And in May, 1723—

Lent Mr. Priestley, Halifax, my brass rhomboid or pocket instrument.
—X red.

the latter being a sign in Mr. Sharp's book-keeping to denote that he had received the instrument back again. The above explanation is given for what it is worth, but it is not sufficient to show how the sun dial, calculated by Nathaniel Priestley and delineated by Abraham Sharp, found its way to Meanwood.

This reference brings us to consider Mr. Sharp as a mechanical genius, and we cannot do better than commence by a quotation from the testimony of Mr. John Smeaton, the constructor of the Eddystone Lighthouse, himself originally a mathematical instrument maker. After a eulogistic passage referring to Mr. Sharp's skill in designing and constructing the mural arc at Greenwich, Mr. Smeaton adds—

I have been the more particular relating to Mr. Sharp, in the business of constructing this mural arc, not only because we may suppose it the first good and valid instrument of the kind, but because I look upon Mr. Sharp to have been the first person that cut accurate and delicate divisions upon astronomical instruments, of which, independent of Mr. Flamsteed's testimony, there still remains considerable proofs; for after leaving Mr. Flamsteed and quitting the department above-mentioned, he retired to the village of Little Horton, near Bradford, Yorkshire, where I have seen not only a large and very fine collection of mechanical tools, the principal ones being made with his own hands, but also a great variety of scales and instruments made with them, both in wood and brass, the divisions of which are so exquisite as would not discredit the first artists of the present times. I believe there is now remaining a quadrant of 4 or 5 feet radius, framed of wood, but the limb covered

with a brass plate, the subdivisions being done by diagonals, the lines of which are as finely cut as those upon the quadrant at Greenwich. The delicacy of Mr. Sharp's hand will indeed permanently appear from the copper-plates in a quarto book published in the year 1718, intitled, "Geometry Improved, by A. Sharp, Philomath.;"* whereof not only the geometrical lines upon the plates, but the whole of the engraving of letters and figures, were done by himself, as I was told by a person in the mathematical line, who very frequently attended Mr. Sharp in the latter part of his life. I therefore look upon Mr. Sharp as the first person that brought the affair of hand-division to any degree of perfection.

The art was subsequently improved by Smeaton himself, but it has since been superseded by the use of dividing-engines, the invention of which is due to Jesse Ramsden, a grand-nephew of Abraham Sharp. After this testimony of the first civil engineer in the kingdom of his period, the reputation of Abraham Sharp as a mechanist might be said to be established. He, however, made many other instruments besides these mentioned by Mr. Smeaton, which are preserved, as well as some which are undoubtedly lost. Among these were a curious armillary sphere, which, besides the common properties, had movable circles and other apparatus for the exhibition and resolution of spherical triangles; a double sector, sextants, quadrants, and dials of various kinds, all of which were contrived, graduated, and finished by himself in the most elegant manner. He also made himself most of the tools used by opticians, clock-makers, mathematical instrument makers, &c. He used no telescopes but those he made himself, the lenses of which were ground, figured, and adjusted with his own hands. His workmanship was not only beautiful, but it was accurate to a degree. Indeed, so very exact was he in his graduations, that none of the mathematical instrument makers could surpass him at any time, and but very seldom equal him.

The building which Mr. Sharp fitted up as his workshop

* As may be ascertained in a subsequent page, Mr. Smeaton fell into an error in respect to the title of Abraham Sharp's work. The book was entitled "Geometry Improved, by A. S. Philomath," and was published in 1717.

still remains, and the position of his lathe is clearly traceable. The building forms a wing to the rear of the main structure, overlooking the large court yard. His bedroom immediately adjoined, and a passage communicated with his study and the tower which served him as an observatory.

Shortly before the time of Mr. Sharp the problem of "squaring the circle" attracted considerable attention from the mathematicians of Europe. Van Ceulen, a Dutchman, by following out the plan of Archimedes, the inscription of polygons in a circle, and describing others of an equal number of sides on the outer periphery, deduced the quadrature of the circle to thirty-six places of decimals. This wonderful achievement caused something like amazement among mathematicians, and Van Ceulen was not only extolled during his lifetime, but upon his tomb was inscribed the process which had lifted him to fame. While this problem continued to engross attention, Abraham Sharp, in the year 1699, undertook for his *own amusement* the quadrature of the circle, which he carried to seventy-two places of figures, being twice the number which Van Ceulen deduced. By another calculation, from a different series, he also verified his work. Mr. Sharp also calculated a table of natural and logarithmic sines, tangents, and secants to every second in the first minute of a degree; and he determined to seventy-four places of decimals the length of the circumference of a circle by means of the series expressing that of an arc in terms of its tangent, which had been discovered by James Gregory, in 1671. The series, when the arc = 30° gives (after being multiplied by six) for the length of the half-circumference, when the semi-diameter is equal to unity,

$$2 \sqrt{3} \left\{ 1 - \frac{1}{3 \cdot 3} + \frac{1}{5 \cdot 3^2} - \frac{1}{7 \cdot 3^3} + \&c. \right\};$$

and in this state it was employed by Mr. Sharp, who underwent the immense labour of computing the values and taking the sum of 150 of the terms within the braces, besides that

of extracting the square root of three to seventy-six decimal places.

We have before us a large sheet in double folio headed—

"The Quadrature of the Circle deduc'd from two different series, whereby the truth thereof is proved to seventy-two figures, by Abraham Sharp."

In a note heading it is stated—"This was undertaken and computed for private use about 1699, without any design of publishing it, but a member of the Royal Society having notice of it, it was sent for by them with the proposal and promise of printing it; but some of them, from sinister views, opposed, detained, and laid it aside, till Mr. Flamsteed, judging it not unworthy of publication, generously and freely offered to print it, together with some other composures of the same author."

The production is altogether too voluminous for publication here, but it clearly testifies to the industry of its author, even for his "own amusement."

Of Mr. Sharp's success in "squaring the circle" we have the testimony of his contemporary Halley, who in his essay, entitled "An Easy Quadrature of the Circle," communicated to the Royal Society, wrote:—

Since Van Ceulen's time there had been many abortive essays towards a perfect quadrature. Much had been done towards facilitating the *calculus* by methods far differing from that of Archimedes, and particularly the doctrine of fluxions, and of infinite series, which might not improperly be called the Geometry of Curve-lines invented by Sir Isaac Newton, which afforded many solutions of the problem. The problem had tempted the ready pen of the most incomparable Mr. Sharp, who had contrived to double the famous numbers of Van Ceulen, a degree of exactness far surpassing all belief.*

* The writer of an article on this subject in the *Penny Cyclopædia*, vol. xix., p. 187, says:—"The ratio was carried to 75 places by Abraham Sharp, to 100 by Machin, and to 128 places by De Lagny, and at the end of the last century to 140 places by Vega; and Baron Zach informed Montucla that he had seen a manuscript in the Radcliffe Library at Oxford in which it was carried to 154 places."

In the Mathematical Tables compiled in 1705, by Henry Sherwin, a contemporary of Mr. Sharp, several contributions of our mathematician are included along with those of Henry Briggs, Dr. Wallis, and Dr. Halley. By the kindness of Mr. Hailstone, we are enabled to give a *fac-simile* of the title-page of this work, with Mr. Sharp's pen and ink additions. The work was evidently sent in sections to the Horton mathematician, and addressed "To Mr. Abraham Sharp, at Little Horton, near Bradford, Yorkshire."

The contents of this scarce volume were arranged under the following headings, viz. :—

Of Logarithms : their invention and use. The xii. chapter of that excellent treatise of Algebra : Written by the late Reverend and learned Dr. John Wallis, Savilian Professor of Geometry in the University of Oxford, and a member of the Royal Society in London.

A most compendious and facile method for constructing the Logarithms, exemplified and demonstrated from the nature of numbers without any regard to the hyperbola. By Mr. Edmund Halley, present Savilian Professor of Geometry in the University of Oxford, and F.R.S.

Of making natural Logarithms, deduced from Mr. Halley's discourse. By the Editor.

Mr. Briggs, his Logarithms for all numbers, from 1 to 100, and for all prime numbers from 100 to 200 ; calculated by that ingenious gentleman and indefatigable mathematician, Mr. Abraham Sharp, at Little Horton, near Bradford, in Yorkshire.

Another different method of making Logarithms, communicated by Mr. Abraham Sharp, derived from Dr. Wallis's Illustration of Mercator's Quadrature of the Hyperbola, in Phil. Trans., No. 38, wherein the greatest part of the work is performed by multiplication, being easier and of quicker despatch than division.

A method of computing the natural sines, tangent, or secant of any arch immediately, from the length of the arch being given. By Mr. Abraham Sharp.

An easy quadrature of the circle ; communicated by Mr. Halley, Professor of Geometry in the University of Oxford.

Of decimal fractions, logarithmick, arithmetick, &c. [Presumably by the Editor.]

Of compound interest and annuities. By Mr. Edmund Halley, Savilian Professor of Geometry in the University of Oxford, and F.R.S. (corrected by Abraham Sharp).

The propositions of navigation that occur in the practice of sailing, by Mercator.

It was apparently indispensable that Sherwin's compilation should be dedicated to some one high in mathematics, and hence the book was appropriately dedicated to Halley, in the following terms :—

*To Mr. Edm. Halley, Savilian Professor of Geometry
in the University of Oxford.*

SIR,

It being universally acknowledged that by the Professors of Geometry in the *Savilian Chair* (viz., *Mr. Briggs, Dr. Wallis, and Yourself*) the logarithmical art hath received its greatest improvements, and the use of those numbers have by them been fully taught and divulged. 'Tis to you, therefore, who succeed and share equally with your famous predecessors in the same honourable post (and in memory of them) that I think myself bound in justice to present these collections.

Mr. Briggs, with excessive patience, calculated these decimal *logarithms*, also the *sines, tangents, and secants*, with their *logarithmick sines and tangents*, all of them to 14 figures, and showed their construction and use, of which Dr. Wallis gives a particular account, which is the introduction to this book.

Then I return you your own compendious and facile method of constructing the *logarithms*, with the reverse of that noble problem, and indeed setting aside what is printed from Mr. Briggs above-mentioned, and
to whom the world is indebted (their)

Mr. Abra. Sharp (the wonder of the last and present age for industry of this kind), the rest of the discourses both before and after the tables are either written or chosen by yourself; therefore I expect your kind acceptance, and remain,

Sir, your very much obliged humble Servant,

HEN. SHERWIN.

Except for a peculiarity to be noted we should not have deemed the reproduction of this dedication necessary in these pages. The peculiarity is this: that in the printed copy sent to Abraham Sharp certain erasures were made by him and the words given in italic interlined, dictated doubtless by the

Mathematical TABLES,

Contrived after a most *Comprehensive Method* :

VIZ.

A TABLE of *Logarithms*, from 1 to 101000.
To which is added (upon the same Page) The
Differences and *Proportional Parts*, whereby the
Logarithm of any Number under 10,000,000 may
easily be found.

TABLES of *Natural Sines*, *Tangents*, and
Secants, with their *Logarithms*, and *Logarithmick*
Differences to every Minute of the Quadrant.

TABLES of *Natural Versed Sines*, and their
Logarithms, to every Minute of the Quadrant.

WITH THEIR

Construction and Use.

By { Mr. Briggs }
 { Dr. Wallis } Savilian Professors of Geometry in
 { Mr. Halley } the University of Oxford.
 { Mr. Abr. Sharp.

The whole being more correct & compleat than any Tables
extant

L O N D O N

Printed by S. Bridge, for ^{Richard Mought & Tho Page} Jer. Seller and Cha. Price,
at Hermitage-Stairs in Wapping; and John Senex,
next Door to the Fleece-Tavern in Cornhill. 1705.

in Postern Row on Tower-Hill MDCCVI

modesty of his nature as more in accord with the share he had had in the work. The incident is one upon which his biographer could not but dwell as illustrating in a marked degree the modesty of Abraham Sharp's character.

The following letter affords some idea of the indebtedness of Sherwin to Mr. Sharp for his contributions to the above work :—

Letter from Henry Sherwin to Abraham Sharp.

LONDON, *March 10, 1704-5.*

MR. ABM. SHARP.

SIR,—I am favered with yours dated 2d inst., which is now before me. He venter your spoiling anything of mine. He onely say if you strip me of my discovery you'll leave nothing that is mine in the booke. However, I am satisfied that whatever you doe in it will be an advantage to it, and I now againe assure you that what you will have in or out of the booke, it shall be or not be as you will. I will take care to insert your paragraff of division of decimals.

All the difficulty of my question of interest is this—the improvement of the interest will not be proportionable (as I consider) to the improvement of the principle. I will explain myself by an instance. Suppose £100 at 6 per cent. for two years, and £100 at 3 per cent. for four years. I know the latter will amount to more than the former, but when people speak of 6 per cent. to be paid half-yearly they do not suppose the £3 due at the first half-year's end shall have 3 per cent. for every half-year, but 6 per cent. per annum. Now, sir, this was my difficulty. Now I think if I am to receive £3 interest for every half-year for £100, and continue it at the same rate, my solution had been right. This is what made me leave it out, and whether it shall be in or out is at your pleasure.

I desire to know how you like Mr. Wingate's pages. I had as leewe make use of him as any one, because a greet deal I have writ is collected from him. More I know about the use of logarithms was first from his booke of their use: besides, he was the first that ever put them in that verry contracting method of the mathematical compendium, which is the same in effect with Mr. Isaac Newton's, who I printed by.

Sir, what you have prepared, or may prepare, shall not onely find room, but shall be the greatest obligation to

Your most obliged humble servant,

HEN. SHERWIN.

To Mr. ABM. SHARP, at Little Horton,
Near Bradford, Yorkshire.

Will it be credited that after this acknowledgment of favours received, Mr. Sharp's sole reward was two copies of the work? Even these he only received after a year's interval, and by the dogged persistence of Flamsteed, who undertook to interview Mount, the publisher, in his behalf.

Henry Briggs, an eminent contributor to mathematical science, was born about 1556, in the parish of Halifax. He received his academical education at St. John's College, Oxford, of which he became a Fellow, and, having distinguished himself by the study of mathematics, he was appointed examiner and reader in that science. On the establishment of Gresham College, he was chosen in 1596 its first Professor of Geometry. About this time he constructed a table for finding the latitude from an observation of the variation of the compass, by an instrument described in Gilbert's work, "*De Magnete.*" The new invention of logarithms, however, was the subject which chiefly occupied his thoughts, and in his lectures at Gresham College he proposed an alteration of their scale from the form given them by their inventor, Lord Napier, to one in which 1 should be the logarithm of the ratio from 1 to 10. For this purpose his zeal for science led him to take a journey to Scotland in order to hold a conference with Lord Napier, and his arguments produced the adoption of his improvement. He then set about calculating logarithmic tables upon this plan, which were published successively as he proceeded, and displayed indefatigable industry, joined with great inventive powers. In 1691 he was nominated the first Savilian Professor of Geometry at Oxford, and soon after resigned his place at Gresham College and settled at Merton College, which thenceforth became his residence for life. He passed his time in studious retirement, deeply engaged in scientific pursuits and the duties of his office, and esteemed for his obliging disposition and integrity till his death—in January, 1630. He was author of several works relating to geometry

and arithmetic besides the tables above mentioned. Briggs became acquainted with Archbishop Usher on a visit of the latter to England in 1609, and was long his correspondent, though two only of his letters are printed in Parr's Collection. In one of them, alluding to some question in Divinity, he says, "My opinion is, he that doth most good is the honestest man."

In Usher's works there are several references to Briggs. In Vol. xvi., p. 316, in a letter from Mr. James Usher to Dr. Challoner, viz.:—"There goeth here current a very good opinion of the religious education of scholars in our College. God grant we may answer that which is concerned of us. I have sent you here enclosed Dr. Favour's letter touching the scholars of Halifax, for whom we dealt with Mr. Briggs." Mr. Briggs, in a letter to Usher from Gresham House, says, "Concerning eclipses, which my cousin Midgeley putteth me in mind of from you," &c. (Vol. xx., p. 89, *ibid*). In a collection of letters illustrative of the progress of science in England, edited by J. O. Halliwell for the Historical Society of Science (London, 1841), are several letters to and from Briggs. A life of Professor Briggs was written in Latin by Rev. Dr. Thomas Smith; also by Dr. Ward, in his "Lives of the Gresham Professors" (p. 120).

Halifax parish has also produced a more recent example of genius in the person of Jesse Ramsden, a native of Salterhebble, afterwards of Piccadilly, London. His skill in engraving and dividing mathematical and astronomical instruments was so great that the Commissioners of the Board of Longitude, in 1777, offered him a large premium if he would undertake to divide sextants at six and octants at three shillings each for the benefit of other mathematical instrument makers. He was also the inventor of dividing-engines, which superseded hand graduation. It was, however, the construction of a large class of astronomical instruments that brought reputation to Ramsden, if not pecuniary gain. The theodolite

employed by General Roy in the English survey was made by Ramsden, and no instrument of the kind that had been previously made would compare with it. His telescopes, erected in the observatories of Blenheim, Mannheim, Dublin, Paris, and Gotha, were remarkable for the superiority of their object glasses; and in his mural quadrants, furnished to the observatories of Padua and Vilna, Dr. Maskelyne was unable to detect an error amounting to two seconds and a-half, a degree of accuracy which at that time was a matter of admiration among astronomers. Mr. Ramsden was elected a Fellow of the Royal Society in 1786, and in the following year the Copley medal was awarded by the Royal Society in testimony of the importance of his many inventions. He died at Brighton in 1800. The father of Jesse Ramsden was a nephew of Abraham Sharp.

As a local incident, it is perhaps worthy of note that Sir John Herschel, the discoverer of the planet Uranus, was for a short time organist of the Parish Church, Halifax, and a somewhat amusing incident is attached to his appointment to this post. Herschel's chief opponent at the trial performance was Dr. Robert Wainwright, a popular composer, and on the day of trial the famous German organ builder, Johann Snetzler, who built the organ, was present. Wainwright was the first to be tested, and in the "thin" style of organ playing of that period he sought to manifest his ability by rapidity of execution. So little did this, however, meet with the approval of the excitable builder, that he ran about the church angrily crying: "Te teyvel, te teyvel, he run over de keesh like von cat—he will not gif my pipes room for to shpeak!" When it came to Herschel's turn to play, he ascended the organ loft, and produced from the instrument such a volume of slow, sustained harmony as captivated all present—the delighted organ builder exclaiming "Aye, aye, tish is vary goot, vary goot indeed. I will haf tish man, he gifs my pipes room for to shpeak."

This was on August 30th, 1766, and Herschel was at once appointed organist at a stipend of fifty-two guineas a year. He soon afterwards removed to Bath, where he turned his attention to astronomy. Here he constructed a telescope of large dimensions, and in 1781 announced the discovery of a supposed comet, which soon proved to be the planet Uranus. He was thereupon appointed private astronomer to the King, with a salary of £400 per annum, and abandoned the musical profession.

Abraham Sharp's elaborate work, "Geometry Improved," so admirably referred to by Mr. Smeaton, affords proof of the great extent of his mathematical knowledge and his persevering labour in calculation. The first part contains a large and accurate table of circular segments, its construction and various uses in the solution of several difficult problems, with compendious tables for finding a true proportional part; and their use in these or any other table exemplified in making logarithms, or their natural numbers to sixty places of figures; and a table of them for all numbers to 100 and primes to 1100, true to sixty-one places. These are published in Dr. Hutton's excellent collection of mathematical tables, being the logarithms of 254 numbers. The second part is a very neat tract on "Polyedra," or solid bodies of many bases, regular and irregular; to which are added twelve new ones with the various methods of forming them, and their exact dimensions in surds or species, and in numbers. The work is illustrated by several copper plates, neatly engraved by Abraham Sharp. He also cut models of these polyedra very neatly in boxwood.

A *fac-simile* of the title page of "Geometry Improved" is given, from the copy in the library of the Royal Society. It will be seen that Mr. Sharp modestly withheld his own name as the author.

The following letters refer to the preliminaries of the publication in London, which were apparently negotiated by

GEOMETRY Improv'd:

1. By a LARGE and ACCURATE.

T A B L E

O F

SEGMENTS of CIRCLES,

Its Construction and various Uses in the Solution of several difficult *Problems*.

With Compendious TABLES for finding a true Proportional Part, and their Use in these or any other TABLES, exemplify'd in making out *Logarithms* or Natural Numbers from them, to sixty Figures, there being a TABLE of them for all Primes to 1100, true to 61 Figures.

2. A Concise TREATISE of

P O L Y E D R A,

O R

SOLID BODIES of many BASES,

Both the Regular and others To which are added Twelve New ones, with various Methods of forming them, and their exact Dimensions in Surds or Species, and in Numbers, Illustrated with Variety of Copper Plates.

By A. S. Philomath.

L O N D O N:

Printed for Richard Mount on Tower-Hill, and
John Sprint in Little-Britain. 1717.

Benjamin Bartlett, the Quaker apothecary in London, referred to on page 67. Mr. Sprint was his friend, and Mr. Mount, the London publisher:—

LONDON, 9th 4th Mo., 1715.

ABRAHAM SHARP.

RESPECTED FRIEND,—I take the first opportunity I can to give thee account of what I have done relating to the printing of thy manuscript. I have shew'd my correspondent the m'script and plates, and have discoursed him about them, but cannot get him to undertake the printing of it at his own charge till he have acquainted himself better of ye worth and need there is of such a book; by reason the charge of it will be considerable, and therefore insists upon having the judgment of Dr. Flamsteed or Halley upon it, both which he nominated of himself without any hint or mention from me. I could not get him to be content without it, so I submitted to have it come under the perusal of Dr. Halley, having first enjoyned him to faithfulness and secrecy, that Dr. Flamsteed may not in any wise hear of it, or any other person. My correspondent and Mount, I suppose, are kind, and I find he dare venture on it if Mount may come in for his share, because he knows, he says, Mount understands all these matters. But seeing I objected to that, and against his being made privy to it, he has agreed to print it upon Dr. Halley's recommendation of it. But if Dr. Halley should not be met with while I am in town, as it is not certain whether he can or no, what I shall do in that case I desire to know per post; as also whether Mount may come in as partner with him in it. He says it will be tedious to do, but if concluded on he will despatch it as speedily as can be.

Pray let my wife, or father, or mother, or any of them, know that I am well in health, through mercy. If thou have any other or further orders about this, pray do it per post,

To thy assured friend,

BENJ. BARTLETT.

Pray excuse such writing, as I am in great haste.

TOWER HILL, July 2, 1715.

SIR,

Mr. Sprint has let me have a sight of your manuscript in order to print it on the account of both of us, or, which would please me as well, to print on your account. I have carefully lookt over it and your directions about it, which I think I am master of, and you

may depend on the having them complied with, only as to having the segments and the difference of two several sets of figures. I wish I could prevail with you to alter your mind and let them be all of one sort, as all other tables that I remember to have seen are, in particular shewing signs and tangents. I have just fitted up a printing house with all new letters and figures, principally for mathematical works of my own copies, and I shall take great care to have everything correct as can be. I should be glad to be obliged with a line from you in answer to this about the different figures. The book should be printed on a demy quarto, and that will admit of more distance between the figures, which seem to be too close together. I shall put the plates to a very careful and skilful hand to finish. They seem to be so fine graved as not to hold printing any number without a little widening as you suggest, but that shall be prevented if possible to make them legible without. They can't be too fine if visible to the eye.

I am, your faithful servant,

RD. MOUNT.

Mr. Sharp, like many authors unknown to fame, seemed to have received scant recompense for the industry and great mathematical ability brought to bear in preparing his "Geometry Improved." Ten years after its publication he was still without the dozen copies promised him by the publisher, as the only remuneration he received. His friend Crosthwait, alluding to this subject in 1727, wrote as follows:

GREENWICH, *March 25th, 1727.*

SIR,

I remember when I was at Horton you were complaining that Mr. Mount had agreed to give you twelve sets of your "Geometry Improved," and you had received but four. In conversation lately with a friend of Mr. Mount's, where you were mentioned, I said I thought it was very hard you should have so small a recompense for such immense pains and labor, and to be even deprived of two-thirds of what they had agreed to give you. On my saying this he promised to enquire into the affair. He has since been here, and says both the sons declare they were strangers to the bargain made betwixt their father and you, but, notwithstanding, they are ready and willing to deliver eight sets more to your order. Therefore, if in your next you please to order me to receive them they shall be sent with the maps, by your most obliged servant,

JOS. CROSTHWAIT.

P.S.—Sir Isaac Newton died last Monday.

LONDON, *August 15th, 1727.*

SIR,

I had the favour of yours of July 28th last, and am sorry to find you think that I tantalized you because I promised what I could not perform. It is not in my power to answer for the neglect and folly of engravers, nor for the vile shuffling of booksellers. I am sure I never wrote or spoke anything to Mr. Sharp but what I sincerely intended, and am sorry it has not been in my power to exceed both. I have, after often attending Messrs. Mount and Page, at last received eight sets of your "Geometry Improved," which shall be immediately sent to you after I have received three or four maps to accompany them.

I hope you will be so good as to impute my long silence to nothing but an unwillingness to put you to unnecessary charge and expense when I have nothing to communicate worthy your acceptance; but since you have given me leave I shall plead no excuse for the future. Dr. Halley, so I hear, lives in taverns. He is very infirm, and is as much known to you as he is to your most obliged and humble servant,

JOSEPH CROSTHWAIT.

The first of these epistles refers to the visit that Crosthwait paid to Mr. Sharp at Horton while upon a journey to his friends in Cumberland, which, so far as evidence goes, was the only occasion upon which the two colleagues, who had so much in common, met. Even yet their labours were not completed. The *Historia Cælestis* had been completed nearly two years, but the maps of the constellations were still unfinished, having entailed no small amount of anxiety on the part of Mr. Sharp, in addition to the labour and pains he bestowed in drawing them ready for the engraver. The reference to Dr. Halley is tinged with the old feeling of bitterness which crops out in several of Crosthwait's letters which are not quoted here.

CHAPTER VI.

Abraham Sharp's life at Horton, continued—Bradford society in 1700—Letters of Mr. Sharp to his grandniece, Faith Stansfield—Her marriage to Richard Gilpin Sawrey—Letters of Mr. Sharp to the latter—The Presbyterian interest at Horton—Erection of a meeting-house at Chapel Green—Abraham Sharp a Presbyterian—Letter from Ralph Thoresby—The Stretton Fund—Lady Hewley's Charity—Growth of the Horton congregation—Erection of a Presbyterian Chapel at Bradford—Rupture in 1730—Letter from Mr. Sawrey—Death of Abraham Sharp—Persons invited to his funeral—Monument in Bradford Parish Church—Copy of his will—Singular incident in connection therewith—Inventory of Abraham Sharp's instruments and tools—Remarks on existing specimens.

The object with which we set out in preparing these memorials of Abraham Sharp was chiefly to present the scientific side of his character. Incidentally, we have alluded to other events in his career, clearly demonstrating that he was no recluse cut off from the every-day concerns of life, although, when absorbed in mathematical problems more than ordinarily difficult of solution, he might have followed the example of the anchorite, and secluded himself for a while. From the variety and nature of his occupations, mental and mechanical, he must have been brought into contact with all sorts and conditions of men, and in various ways have been in touch with the world around him. Doubtless the circle in which he moved was a very restricted one. Scientifically, it was a very narrow one indeed. When Mr. Sharp took up his permanent abode at Horton Hall the little market town

of Bradford scarcely exceeded the dimensions of a large village. The town consisted of three main streets—Westgate, Kirkgate, and Ivegate. Both on the upper and lower side of Kirkgate and Westgate, meadows, crofts, and orchards abounded. The township of Horton comprised two hamlets, Great and Little Horton, its conformation being agreeably diversified, the upper portion containing numerous eminences, from which extensive views are obtainable. Horton probably gave its name to the family which for generations held possessions here. The principal landowners were the families of Sharp, Booth, Lister, Holdsworth, Mortimer, Swayne, Nicholls, Brooksbank, Field, Hammond, Hodgson, and Stansfield.

The "society" of Bradford comprised few persons with whom Mr. Sharp could hold converse on scientific subjects, consisting chiefly of shopkeepers and small clothiers, who would doubtless regard their mathematical neighbour at Horton as a musty bookworm, or perhaps something worse. Happily Mr. Sharp possessed within his own domain resources sufficient to render him independent of the world around him. His disposition was remarkably humane and kind, and, although a bachelor, he appears to have been in sympathy with the youth about him, and to have lacked none of the graces which beautify and ennoble mankind at its best. In his domestic concerns there were few elements of a disturbing character beyond what fall to the lot of mankind in general, namely, by the deaths of those near and dear to him.

After the death of his nephew, Dr. John Sharp, Mr. Sharp's chief solicitude was for the careful bringing up of his grandniece, Faith Stansfield, the daughter of Robert Stansfield, by Abraham's niece, Elizabeth Sharp. There were six sons and two daughters of this marriage, but only Faith survived. The only child of the household in which he resided, and the heiress of his estate, Faith Stansfield was pre-eminently the child of hope, and from the tenor of the subjoined letter it would appear that her life had been in

jeopardy from severe sickness. She had now recovered, however, and was at school at York, to which ancient city the letter was addressed as follows :—

To
M^{rs} Faith Stansfield
at M^r Hothams on
Puisam Green near
Latham Pastern
York

DEAR NIECE,

It is with no small pleasure yt I see a Letter under your hand, tho' I am not altogether insensible from whose head it proceeds. Yet you & I have great reason to prayse God yt after so threatening a sickness you are in so good a capacity of writing, tho I perceive, either through disuse or from ye relicks of your distemper affecting your hand with a little weakness or trembling, or ye disagreeableness of your Pen, your letters are not so regular & fair as I could have expected & wish'd, yet I hope when you come again to Horton to see these defects in good measure rectified & repaired.

Your tacit accusation of my forgetfullness of you is groundless, since ye time of your absence has not been so long as to wear out ye memory of one who has been & is so dear to me, tho' I have not hitherto writt, being so well acquainted with your temper yt I know it would have occasiond rather your surprise & trouble yn satisfaction, & would have created you some uneasiness & pain in ye answering had you not mett with such assistance as you now enjoy, which I cannot but (upon your account) be very gratefully sensible of, & hope you will manifest yourself to be so too, therefore desire you to present my most hearty respects & Service to Mr. Hotham and his good Consort, tho' unknown, who is pleasd to condescend so much in acting ye part of a kind & prudent Governess, to whom you owe, & desire you'll look upon yourself as obliged to pay, ye profoundest respect, deference, & observance. Since

you are favoured with greater advantages under their inspection & conduct yn could have been expected, pray do not fail to improve them to so good purpose, submitting yourself to be entirely ruled & managed by them, so as may redound to their & your own abundant satisfaction & benefitt.

I never was nor shall (I presume) ever be guilty of so much vanity as to predict the appearance of Comets, which I know is beyond ye reach of Art. Whoever those great men be yt pretend thereto, 'tis very probable they will not a little hazzard their reputation, & lessen themselves thereby, but let us be content to move within ye compasse of our own Spheres, & refer all events to ye disposall of ye Allwise governing Providence of God, who, if we do but serve him faithfully, and keep in ye way of our duty, will undoubtedly order all things for ye best, & though you & I & yr relations have been & may be exercised with variety of dispensations, yet that every thing may be sanctified & conduce to our spirituall & eternall welfare is ye sincere desire and prayer of

Your most Affectionate Unkle,

ABRA. SHARP.

HORTON, *November 4, 1717.*

In 1722 Faith Stansfield was married to Richard Gilpin Sawrey, of Broughton Tower, Lancashire, and resided after marriage at Horton Hall with Mr. Sharp. This marriage was not brought about without some amount of negotiation, as is evident by the following epistle, addressed to the young lady's mother by a cousin of the suitor. It is endorsed "To Mrs. Stansfield, at Bradford," and is dated—

WHITEHAVEN, *September 29th, 1720.*

MADAM,

I humbly beg leave to be permitted to renew my solicitations on behalf of my cousin, Mr. Sawrey. The last visit he made to Bradford not giving all the satisfaction he hoped for, he comes now in expectation of meeting with opener declarations of your acceptance in the weighty affair which has been some time depending. For till you in some measure countenance him he can have no foundation for hope, or be permitted to address himself to the young lady, your daughter, who cannot be supposed to listen to any overtures of this nature till your approbation be fully known. Persons who come on these errands can at first at best expect no answers, but look upon it as a privilege enough to make their proposals, leaving a full account of themselves to be considered of; but if no doubt happens in these matters after some time has been spent, the concern then rises higher, not knowing whether to apprehend hope or no. It were unreasonable that I should expect that

my request should have any prevalence with you; yet I humbly hope, all things fully considered, which there is no doubt you will in the best manner do, there may be cause found to cast some kind aspect upon this design, if the good providence of God be towards us. My humble service to all the good family, and am, madam,

Your humble servant,

JOHN GILPIN.

Mr. Sawrey's business connections were in Cumberland, which necessitated his frequent absence from Horton. The death of Mrs. Stansfield, his niece, and the fact that Mrs. Sawrey was frequently travelling with her husband, involved a close supervision on Mr. Sharp's part over the affairs of the family, and called forth many letters from him, which were addressed to his nephew. In most of these there are desires expressed for the well-being of his grandniece, the last of his race, which are most parental in their tenderness. Three letters only can be given, one of them being in *fac-simile*:—

To RICHARD GILPIN SAWREY, ESQ.,

Scalby, near Carlisle, Cumberland.

DEAR NEPHEW,

I am very glad to understand that you have arrived safe in Newcastle, but sorry you should leave us here so hastily when your presence must necessarily be desired and expected at the funeral of your sister, who departed while I was present on Saturday morning about seven, of which I presume you have received an account from father, who promised to write to you per post the same day. And now, having no other so near relation left as my dear niece, your consort, I cannot but be very solicitous about her, since she is now at so great a distance and exposed to so many fatigues and perils by so frequent and tedious journeys, which I think are very unfit and hazardous, especially at so bad a season, for so tender a young woman to undergo, though I question not your care of and concern for her, since it is both your duty and interest. But I trust to the Divine Providence, which has hitherto been your safeguard, to prevent all evil, both hurtful and frightful accidents, and restore you to us again in health and safety, which I hope this said Providence will rather hasten than retard. I pray God sanctify this so severe unexpected rebuke of His providence to us all, that the consideration of the instability of our most valuable earthly comforts, and the uncertainty and shortness of our continuance in this troublesome world,

may quicken us to greater care and intelligence in the despatch of our spiritual work and getting into a due preparedness for our entrance upon an unchangeable happy eternity. I shall be glad to hear of your health and safe arrival at the particular stages where you intend to reside any time, especially when you come at Broughton, whence I hope to have an account when you destine to return. My most cordial respects to your mother, uncle, and brother, and all to whom I am known that inquire about me, and accept the same with utmost integrity to yourself and my dearest niece, from your most affectionate uncle,

ABRA. SHARP.

Horton, Sep. 29, 1724.

P.S.—I have paid the half-year's window tax for you—15s., but he upon whom you gave me £20 bill comes not.

Dear Nephew

Although y^e desired me to direct to y^e at Whitehaven yet since your stay at Scaleby has been much longer y^e intended & I may justly conclude y^e Mother and her present sorrowfull circumstances will be desirous to be at home & I presume y^e stay at Whitehaven will be so short y^t this might come wth less hazard & more certainty to Broughton where I need not question you will meet wth it more surely though perhaps not so soon as you desire but since there's nothing of importance to trouble you wth y^e short delay will be of little moment I cannot but heartily condole wth you y^e loss of your good Brother which suddain unexpected stroke is a very heavy addition to y^e afflictions God is pleased to visit us wth but he is infinitely Wise & Good & knows what is best & most proper for us & in his disposing Will & pleasure 'tis our duty quietly & contentedly to acquiesce looking up to him for his blessing upon whatever he dispenseth wth such sanctified fruits may be produced y^t our souls may be real gainers by these temporal losses y^e we may comfortably hope all things shall work for our eternal good God is allsufficient & infinitely good & gracious & I hope will put under his everlasting arme & support your afflicted Mother under this severer dispensation & render it really advantageous my cordial respects & service to her & your Uncle (y^e we him as for this) & to M^r Thorley my tenderest affection to your self & my dear Niece We are all m^{ost} to be God in tolerable health The Gov^r has calld 4 days agoe is well but very unruly & unmanageable The Maids do well as far as I know I hear nothing of y^e Man upon whom y^e bill of 20th you left wth me is drawn he takes advantage of your absence to delay y^e payment & I perceive has no intention whatever promise he made y^e to pay y^e whole or any part of it to me but there's like to be occasion for y^e calling upon & quickning him. I hope this will find y^e both in good health & thinking of & preparing for your return wth that may be safe & speedy & y^e you may be prosperous & happy both in Soul Body & Estate is y^e unforgotten constant desire & prayer of

Horton Octob^r 29 1724

Your most engaged & affectionate Uncle
Abra. Sharp

HORTON, December 24, 1724.

DEAR NEPHEW,

Although I have not written to you so frequently as you desire, yet, however you take it, I think the omission on my part is very excuseable on account of my growing infirmities and the inconveniences I labor under, the trembling of my hands so increasing upon me that I can but sometimes, and with much difficulty and slowness, write so as may be legible, and when I have writ I have nobody to employ, but must carry the letters myself to the post. However, I am but one behind hand with you, and had anything material worth postage occurred I had been even with you; your so long absence from hence has been a far greater prejudice to you, though I believe much less trouble, than to me. You have been absent during the sickness and death of two of your near relations, and the damage you have sustained thereby I am well assured exceeds what you are at present apprehensive of; but should you both be absent during the sickness and death of the third, though not so near, which may reasonably be supposed to happen in some of so many tedious journeys, especially considering the decays, infirmities, and weakness of nature, the certain loss that would accrue to you thereby would many times exceed all your former disappointments. But this I refer to your consideration. I am glad you are at length determined to return, though I had a shrewd suspicion that you would first have despatched your Candlemas affairs. If you return sooner I shall conclude either that business is done or that you are guilty of a greater piece of self-denial than I was aware of; but may reasonably hope this long stay may stand instead of another journey. However, your return to Horton, whenever it is, will be very acceptable. It is a great mercy, for which I desire to render hearty thanks to God, that you enjoy your health so well. I have been under no little fear for my dear niece lest such tedious journeys, great fatigues, and changes of air should have a bad influence upon her tender constitution. It has been a very sickly season here, though now more healthful; many have been down in the neighbourhood, some dead. I have attended two, namely, Mary Lister, Mrs. Midgley's younger aunt, and Joshua Stansfield's wife, and have not wholly escaped a troublesome and tedious indisposition, attended with a grievous cough, which our neighbour, cousin Isaac Sharp, who presents his kind respects, together with Mr. Cockroft, was at the same time afflicted with, but now, praise be God, it is removed. I hope your mother's trouble is by this time in so good measure abated that, after so long stay, the parting with them will be no addition to her grief, though it will be much to our satisfaction; but I fear we shall not be able to comply with your desires in brewing a barrel of beer so soon as you expect, for want of sufficient quantity of malt. You know we have none to send for it, and James Fielding's assistance is precarious and uncertain, but shall endeavor to get it done as soon as may be, that you may not be unprovided of necessities, since the beer prepared before, though bottled, I fear is not fit for your use. I hope in a little

time to see you both here in health and safety, and that your natural and spiritual health may be continued and confirmed, and that your journey may be speedy, safe, and prosperous is the constant hearty desire and prayer of your most endeared uncle,

ABRA. SHARP.

P.S.—Thomas Swaine presents his services, and desires you would not forget that writing or deed you told him of, whereby he may be informed how money come for the benefit of the chapel may be effectually secured.

The Presbyterian interest at Horton dated from the passing of the Act of Uniformity, and had no more devoted adherents than the family of which Abraham Sharp was a member. His elder brother, the Rev. Thomas Sharp, M.A., a member of Clare Hall, Cambridge, and for a while Vicar of Adel, was silenced by that Act, and retiring to his father's house held services privately there. A congregation was gathered which numbered such influential families as the Swaines, Balmes, Hodgsons, Hollings, and others. Immediately after the Revolution of 1688, full advantage was taken of the Act for licensing meeting-houses for public worship, and among the list of such places registered at Wakefield Sessions, we find under date January, 1689, the following entry :—

Thomas Sharp, of Little Horton, nigh Bradford, clerk, doth make use of his own house to assemble in for public worship.

The erection of a chapel or preaching place followed, the site of which was probably given by the Rev. Thomas Sharp. In his will, dated 1693, he bequeathed to his daughter Elizabeth, the wife of Robert Stansfield, a close of land at Little Horton called Higher End, described as "near the new meeting-house." The exact position of this, the birth-place of Nonconformity in Bradford, has formed the subject of some contention, but James, the historian of Bradford, was doubtless correct in fixing it at Chapel Green, in Thornton Lane, the building in question being called Chapel House.

In the deeds conveying the property it is there described as "Horton Old Chapel," and several adjoining fields as "Chapel Croft" and "Chapel Ing." This view is amply confirmed by the notes left by Abraham Sharp, and quoted on page 59. Among other entries he refers to certain distances measured by his "way-wiser," a contrivance of his own for measuring distances. One of them gives the distance from Horton Hall gates to Horton Chapel as 5 furlongs, 8 chains, 28 links, or 1280 yards. By a recent measurement we found the distance to Chapel House, Thornton Lane, to be exactly that named in Mr. Sharp's notes.

Abraham Sharp inherited all the tendencies towards Presbyterianism exhibited by his brother, the Rev. Thomas Sharp. Immediately after the death of the latter, Abraham Sharp gave the use of a room in Horton Hall for an examination of candidates for the ministry, namely, Jonathan Wright, Nathaniel Priestley, and Accepted Lister. After which both candidates and ministers—doubtless including the Rev. Oliver Heywood—adjourned to the meeting-house, "where there was a great assembly." Mr. Wright and Mr. Priestley officiated occasionally as ministers at Horton. Mr. Sharp was on the most intimate terms with both ministers and laymen, and so continued to the day of his death. The following letter from Ralph Thoresby, the Leeds antiquary, addressed to him, has a twofold interest, as will appear upon perusal:—

WORTHY SIR,

I fear the loss of good Mr. Stretton will be sensibly felt by our Northern ministers who used to receive from the fund. Mr. Berry* came lately to ask my advice, and we agreed, yt seeing I could not procure an answer from young Mr. Stretton, that he should write to Mr. Bates, but I presume he hath not yet got an answer, but since then I am told by a minister from Greenhough Hill that he hath

* Elkanah Berry, of Pudsey, afterwards of Hopton.

got some from Dr. Colton, of ye Lady Hewley's. Pray say whether any has been received for Horton from either place. I shall be glad it be continued, let it be by whatever hand may please.

In the catalogue of the curiosities of the Royal Society is mention of an oval undulated . . . of turned work. Dr. Grew, in the printed description, adds, "The art, I think, is now dead with the author," but if I misremember not, I have seen a piece of yt nature of your own workmanship. I had an oval box sent me from Towneley, but it proved not turned work, but impressed upon softened leather. May I presume if you have but an useless fragment of such a thing to beg it of you for this museum. However, if you will be so kind as to favour me with a line, which I hope old respects betwixt the family will continue, you would do for,

Sir, your humble servant,

RALPH THORESBY.

LEEDES, 31 August, 1713.

My service to your nephew and neice, and to Mr. Priestley* when you see him.

The instincts of the antiquary assert themselves in the letter of Thoresby in pressing for a contribution for the museum at Leeds, which owed so much to his collecting.

Among the benefactors who befriended Nonconformity at the period to which we are referring were two ladies of rank, namely, Lady Mary Armine and Lady Hewley. The first-named was a granddaughter of the Earl of Shrewsbury, and left a sum of money to be employed in assisting poor Nonconformist ministers. Of this fund, the Rev. Richard Stretton, minister of Haberdashers' Hall, London, was the administrator, and Ralph Thoresby the Yorkshire correspondent. Mr. Stretton was himself distinguished for his benevolence, and the endeavours he made in raising sums of money for distribution among poor congregations led to his bounty being called the "Stretton Fund." He was an Oxford collegian and quitted his living, and, not being satisfied to conform, became chaplain to Lord Fairfax, who settled upon him and his wife a handsome annuity. He

* Nathaniel Priestley.

afterwards removed to Leeds, and then to London, where he died in July, 1712. A still greater benefactress to Non-conformity was Lady Hewley, wife of Sir John Hewley, of York. In 1704, some time before her decease, she conveyed considerable property to trustees for the maintenance of a fund for the benefit of distressed godly persons, the education of young men for the ministry, and the preaching of the



GATEWAY FROM HOWLEY HALL.

Gospel in poor places. Dr. Colton was her pastor, and Mr. Stretton was one of the trustees. This charity was the subject of much litigation for many years, which was only finally set at rest in 1842.

In the year 1716, the Rev. Eli Dawson being then minister at Horton, the Presbyterian congregation, it is said, numbered 500, forty of them having county votes. Up to

that period there was no Presbyterian place of worship in Bradford. The desirability of supplying this deficiency led to the erection of a place of worship in Chapel Lane, Bradford, but just within the Horton township. The site was given by Robert Stansfield, drysalter, of Bradford, who married Abraham Sharp's niece, and was a portion of Murgatroyd Croft, inherited by his wife from her father, the Rev. Thomas Sharp. A portion of the materials used in the erection of the chapel, especially the wainscoting, was brought from Howley Hall, near Batley, as appears by a document in the possession of Mr. Hailstone. These materials included a massive gateway, with ornamental pediments, a sketch of which is given. The building was entered upon in 1719. Abraham Sharp was a trustee of the chapel, and a liberal donor towards the building fund, as we find by various entries in his memorandum books, of which the following are a few :—

1716—Gave Isaac Sharp towards building a meeting									
place for his brother, Mr. Smith*	...	...	...	...	...	£	0	10	0
Mr. Dawson, for entertainment at lecture	...	...	...	...	...	0	2	6	
Abrm. Firth, clerk	...	...	...	...	...	0	0	6	
1718—Workmen at Chapel	...	...	...	...	...	0	2	0	
Sacrament...	...	...	...	...	...	0	2	6	
Vicar Kennett†	...	...	...	...	...	0	2	6	
His Clerk...	...	...	...	...	...	0	0	3	
Collection at Chapel	...	...	...	...	...	0	2	6	
Paid Thos. Swain towards new Chappel	...	...	...	...	...	10	0	0	
Paid him	...	...	...	...	...	5	0	0	

The Rev. Eli Dawson continued his pastorate at the new chapel until 1729. He was succeeded by the Rev. Joshua Hardcastle, and afterwards by the Rev. John Smith, of Mixenden. About the year 1768, during the ministry of the

* The Rev. Matthew Smith, who founded the Nonconformist Chapel at Mixenden, married Susannah, daughter of Lieutenant Isaac Sharp, of Horton, and had a son, John, afterwards minister of the Presbyterian Church, Bradford.

† Vicar of Bradford.

son-in-law of the latter, the Rev. John Dean,* the congregation became Unitarian, which it has since remained.

The following letter, although somewhat lengthy, contains references to the old Presbyterian Chapel, which even after this lapse of time are not without interest. It is from Mr. Richard Gilpin Sawrey to Abraham Sharp. Mr. Sawrey was still an absentee for a considerable portion of the year, although while at Horton he interested himself in the affairs of the district. He was on the Commission of the Peace, and an active upholder of the Presbyterian interest in Bradford. The principal portion of the letter quoted and written by him is in reference to a rupture which occurred at the Presbyterian Chapel, by the displacement of the Rev. Eli Dawson in favour of Mr. Joshua Hardcastle.

For Mr. ABM. SHARP.

BROUGHTON, *November 2, 1730.*

HONoured SIR,

The duty which I owe to my mother and country, and the attendance that I am obliged to give to my own concerns, requires my being on this side so long and so often that I must either separate myself from my wife, or expose her to the frequent trouble of accompanying me in journeys. This I have submitted to with a great deal of cheerfulness, and have given more than the half of my time to Yorkshire out of regard and duty to you who stand in the room of a parent to us, and that the ancient house at Horton might not be broke up, nor have I till of late been uneasy in thus doing, though it interfered pretty much with my present interest; as he who might be a generous father, not thinking fit to extend kindness and liberality according to his circumstances and what is common in the like cases.

But all this did not much affect me, so long as we apprehended we were obliging and doing our duty to you, and sat easy under an agreeable ministry. But I am in the utmost trouble for the unhappy want of union there now is in the society; and I am the more concerned as I am satisfied you must be informed that a great deal of blame is due to me that I am not fit to be the keeper of Mr. Stansfield's assignment, nor to be always consulted in the matter of the trust. I can appeal to the sincerity of my intentions, both for the good of the congregation and to oblige you; and I think I can make this fully appear to the world, if I had an opportunity given and it were thought proper; and I also

* The Rev. John Dean ministered from 1768 to 1813.

apprehend that the substance of the charge against Mr. Hardcastle's friends will prove true upon the strictest examination, and if so the unhappy divisions took rise from those faults, and all possible satisfaction ought to be given, without which there can be little hope of a good Christian composure. It bears exceeding hard upon us both to have a minister imposed upon us by an unbecoming management as we take it, and then to have the blame cast upon us of being peace-breakers and excluders of Mr. Dawson. We desire no more than to have the blame laid where it ought to be, and if we deserve it we will take to it and make every acknowledgment that can be desired, and we can expect no less from them. I think we have been mostly to blame in being too condescending towards them, but this we did with a good intention for peace and union, but it had no other effect but to make them more stiff.

I have had a great deal of trouble in the matter, having frequently held the pen for the party, and perhaps I have wrote some things with too much sharpness, but I believe if all circumstances and provocations were understood I should not be much condemned on this head. I wrote nothing material but what you saw, and what you seemed not to approve was not sent, for my full intention all along was not to do anything that was disagreeable to you. But somehow, unfortunately, we have not well understood one another of late, which I think is owing to the artifice and troublesomeness of some during my absence, in order to accomplish their own ends by creating a misunderstanding betwixt us. My intention in writing this is that we may explain ourselves one to another, and that as we are one family we may act in perfect concert and harmony; and as it is my place to condescend, all that I desire is that you will inform me how you would have me act, and that you will please to hear both sides and then determine as to you seems meet, for we desire you will be moderator amongst us, which if Mr. Hardcastle's friends would have submitted to some time ago, matters had not been brought to the pass they now are.

I have above told you what we desire, that those who we think have acted unworthily may be put upon their vindication, acknowledging their faults or withdrawing, and I think something of this kind may be very well expected of Thomas Swaine and a few that are his accomplices, and it will probably contribute much to the peace and union of the ancient society, for his conduct ought not and cannot be sat down with and indulged.

But I submit all these things to your consideration, and as I have given you the authority of a father over me I shall obey your commands with all dutifulness, and to act in conjunction with my wife, or those that fill the places of Mrs. Sharp and Mrs. Stansfield, without whose generous assistance and yours, there would never have been a chapel at Bradford.

Your most dutiful and much obliged nephew,

R. G. SAWREY.

Mr. Sharp was a regular attendant at the Presbyterian Chapel so long as he was able, and it was upon the occasions of his passing backwards and forwards between Horton and Bradford that opportunity was taken by his indigent neighbours to obtain alms from him. On these occasions it was usual for him to hold his hands behind him filled with coppers, which he allowed to be taken out without turning his head. This we have on the testimony of Dr. Fawcett, in his "*Life of Oliver Heywood*," whose information is the most reliable, as he had it from those who personally knew Mr. Sharp. On the same authority we learn that the Horton astronomer was very feeble for several years before his death, which took place on the 18th of July, 1742, in the ninetieth year of his age. He was interred at the Parish Church, Bradford, with great solemnity, on which occasion a funeral oration was pronounced, in which were recited some of the principal transactions of his life.

And thus was brought to an end the earthly career of a man whose memory his fellow-townsmen have just cause to hold in lasting remembrance. In the scientific sphere in which he so greatly distinguished himself Bradford has produced no equal, nor has England given birth to a more painstaking, devoted, or—remembering the age in which he lived—a more talented student of astronomical science.

The following is a list of the persons invited to his funeral:—

Sr. Walter Calverley
Dr. Richardson
Mr. Thomas Lee
Mr. Samll. Lister
Mr. Tillotson
Mr. Eli Dawson
Mr. Stapleton
Mr. Hulme
Mr. Hardcastle
Mr. Jonn. Priestley

Thos. Thornton
Wm. Mountain
Jacob Hudson
Jno. Rhodes
Wm. Duckworth
Jas. Swaine
Robt. Sugden
Wm. Booth
Jos. Skelton
Richd. Wolverstone

Mr. Smith	Richd. Thorp
Mr. Leeds	Jno. Balme
Mr. Buttler	Jno. Sowden
Mr. Kenett	Tim. Deighton
Mr. Stansfield and Mrs.	Wm. Wheeler
Mr. Wm. Curtis	Elkanah Blaymires
Mr. Balme	Jas. Gill
Mr. Hird, a scarf	Wm. Swain
Dr. Firth	Isaac Wilkinson, Low Green
Mr. Oldfield, a scarf	Michl. Pighills
Mr. Isaac Sharp, a hat band	Jonas Dean
Mr. Bartlett	Moses Copley
Mr. Fountain	Wm. Robertshaw
Mr. Stapleton	Jonatn. Roberts
Mrs. Stansfield, Horton	Samll. Judson
Mrs. Lee	Jos. Blagbrough and Wife
Miss Midgley	John Shaw
Mrs. Hardcastle	Joseph Wood
Mrs. Rhodes	Samll. Ward
Mrs. Grace Cockroft	William Pollard
Mrs. Hodgson	Sarah Cook
Miss Lindley	Emanuel's Wife
Mrs. Hulme, kid gloves	Mary Fieldin
Jno. Lister	Samll. Gargrave
Tho. Atkinson	Widdow Pyrrah
Thos. Swain	Joseph Mountain
David Pratt	Jno. Duckworth
Ezra Taylor	Widdow Sugden
Jonatn. Tetley	Jer. Thornton
John Topham	Jos. Stansfield
Jonas Wilson	Wm. Hardcastle
Isaac Wilkinson	Sr. Walter Calverley's servts.
Andrew Hodgson	Miss Midgley's servts.
Jonan. Craven	Mr. Lee's servts.
Jno. Denton	Mr. Stansfield's, Bradford
Jno. Deighton	Mrs. Stansfield's maid
Isaac Firth	Betty Shevin
Ben. Taylor	John Ogden
David Armitage	Rich. Ward
Samll. Kitching and Wife	Dr. Richardson's boy

Happily, the burial-place of Abraham Sharp, unlike that of his former employer and coadjutor, Flamsteed, is not a subject for conjecture. In the chancel of the Bradford Parish Church is an elegant mural tablet, by Scheemaker, erected to

the memory of Abraham Sharp by his great-grandniece, Frances Sawrey.

The following is a copy of the classical inscription, and also a translation supplied to the *Bradford Antiquary* by the Rev. John Chute, M.A., while vicar of St. Jude's, Hunslet. The monument is surmounted by an oval escutcheon bearing the arms of the Sharp family, also a crest, the upper portion of which has been broken off:—*Arms*—A pheon, within a bordure, charged with eight roundels. *Crest*—Part of the head of an eagle erased, the neck encircled by a ducal coronet.

Inscription on the Monument of Abraham Sharp.

H.S.E.

QUOD MORTALE FVIT
ABRAHAM SHARP STIRPE ANTIQVA PROGNATI
ET ARCHIEPISCOPO EIVS NOMINIS EBORACENSI
SANGVINIS VINCVLO CONIVNCTI
QVI INTER PERITISSIMOS
SVI TEMPORIS.
MATHEMATICOS MERITO NVMERATVS
CVM VIRIS EADEM LAVDE CELEBERRIMIS
FLAMSTEEDIO PRAESERTIM ET ILLVSTRISSIMO NEWTONO
PERPETVAM COLVIT AMICITIAM
QVORVM PRIORIS HISTORIAM CAELESTEM
IN TABVLIS ACCVRATISSIME DELINEAVIT
VARIA ITEM SCRIPTA ET INSTRVMENTA A SE CONFECTA
SVPPRESSO TAMEN NOMINE IN LVCEM EMISIT
CVM VITAM AVTEM HISCE STVDIIIS
PLACIDAM ET VTILEM COELEBS PERECERAT
IN DEVM PIETATE IN PAVPERES BENIGNITATE
IN OMNES BENEVOLENTIA INSIGNIS
ANNO DENVM AETATIS NONAGESIMO PRIMO
RERVH HVMANARVM SATVR IN COELVM DEMIGRAVIT
XV KALEND. AVGVST. MDCCXLII
FRANCESCA SAWREY PRONEPTIS TESTAMENTIQVE
CVRATRIX
HOC MONVMENTVM HONORIS CAVSA SVMPITV SUO POSVIT

P. Scheemaker, Fl.

TRANSLATION.

Here has been laid what was mortal of

ABRAHAM SHARP,

sprung from an ancient stock and united in the bond of relationship with the Archbishop of York of that name, who, being deservedly numbered amongst the most skilful mathematicians of his time, cultivated a lasting friendship with men most distinguished by a similar renown, especially with Flamsteed and the most illustrious Newton. The history of the heavens by the former of whom he most accurately delineated in tables, various writings also and instruments made by himself he sent forth into the light, suppressing however his name. But when he had spent as a bachelor a peaceful and useful life in these studies, distinguished for his piety towards God, by his kindness towards the poor, and benevolence towards all, at length in the ninety-first year of his age, sated with human affairs, he passed to heaven on the [18th of July,] 1742.

Frances Sawrey, his great-grandniece and executrix of his will, erected this monument in his honour at her own expense.

It will be noted that Mr. Sharp is said to have died in the ninety-first year of his age. This is an error which has been frequently repeated; the commonly received notion having been that he was born in 1651. He was, however, born on June 1st, 1653, and had, therefore, only entered upon his ninetieth year.

A remarkable incident which it is now our duty to record is that in connection with the will of Mr. Sharp. Mr. Samuel Lister, attorney, of Bradford, writing in April, 1768, to Mr. Francis Bridges, attorney, of Leeds, who married Elizabeth Stapleton, the eldest daughter of Francis Stapleton and Dorothy Sharp*, said that there was no copy of Abraham Sharp's will that he had been able to find but one unexecuted. This was a quarter of a century after the decease of the astronomer. As both the gentlemen above-named were interested in the disposition of the Sharp estate, it may therefore be assumed that every possible effort had been made towards that end. It is singular that so methodical a man as Mr. Sharp should have left undone

* See the Powell pedigree.

what he himself had done for many of his neighbours and relatives. The following is a copy of the unexecuted will of Mr. Sharp, from which it will be seen that administration was granted to Hannah Gilpin in the month following that upon which Mr. Lister wrote to Mr. Bridges :—

Copy of Will of Abraham Sharp.

(Unexecuted.)

In the name of God, &c., I, Abraham Sharp, of Little Horton, being aged and infirm, but of sound mind and memory (praise be given to Almighty God), calling to mind the uncertainty of this mortal life, do make and ordain this my last will and testament for the ordering and disposing of my temporal estate in the manner following, vizt. :—

And first I do give and bequeath to Faith Sawrey, my grand-neice, and to the heirs of her body lawfully issuing, all that close of land lying and being in Little Horton aforesaid, commonly known by the name of Lidgets, now in the tenure or occupation of Rich. Gilpin Sawrey, my grand-neice's husband ; also all that close of land called Little North Croft, lying in Little Horton aforesaid, now in the tenure or occupation of Samuel Stansfield, of Little Horton, worsted comber ; also to the said Faith Sawrey four hundred pounds, for the securing of which to me certain lands lying in Little Horton are mortgaged, which lands are now in the possession of Robert Stansfield, of Bradford, salter, by reason of his marriage with the sole heiress thereof, Elizabeth Sharp, my said grand-neice's mother, deceased.

I also give to my said grand-niece all my right and interest to the said mortgage and to the interest of the said four hundred pounds, that is, twenty pounds yearly, during the natural life of Robert Stansfield ; also to my grand-niece I give all the several sums of money owing upon bond, vizt., two hundred pounds by Mr. Robt. Gilpin, merchant, Whitehaven ; also two hundred pounds owing to me by Mr. Gilpin, Mr. Killham, and Mr. Jackson, of Whitehaven, sugar bakers, like £450 owing to me by Rich. Gilpin Sawrey, my gd.-neice's husband ; also to my grand-niece all such sums of money as shall be found lying by me at my decease, or which may be owing to me by bond ; likewise all my books, instruments, and goods, excepting such as are hereafter mentioned to be otherwise disposed of, provided that my debts and funeral expenses be all discharged.

I desire and will that such maid servant as hath lived in the same house and family with me two years or more shall have forty shillings given her, but if only one year then but twenty shillings. To William Cook, if he be servant to my family at my decease, I desire forty shillings may be given him, and to the other men servants twenty shillings. And it is my will and mind that all the five volumes of

the first edition of Matthew Henry's Exposition of the Old and New Testament be given to the trustees of the Dissenter's Chapel, near Bradford, for the use of the society appertaining to the said Chapel. But if it shall please God that my grand-neice, Faith Sawrey, should dye not having any heir of her body, then it is my mind and will that her above-named husband, Rich. Gilpin Sawrey, shall have and enjoy the four hundred pounds which are in the hands of Mr. Gilpin, of Whitehaven, and his partners, and also the £450 to which he is bound to me, and also the mortgage of certain lands in L. Horton, now in the hands of his father-in-law, Mr. Robt. Stansfield, with the interest arising therefrom, and like wise my two fields, in Little Horton, the Lidgets, and the Little North Croft, provided and upon condition that he take particular care that the interest of the aforesaid £850, which is £42 10s., be paid to me punctually yearly during the term of my natural life, but if the payment of the above interest should be neglected and withholden in whole or in part

Then it is my will and mind that if my said neice, Faith Sawrey, dye without lawful issue ——— Moreover, having lately purchased a small estate in Bradford, formerly in the possession of Chrissr. Jackson, dyer, it is my will and desire, and I hereby nominate and appoint Rich. Gilpin Sawrey, of L. Horton, and John Atkinson, of Bradford, butcher, and Thomas Swain, of Bradford, salter, feoffees in trust for the management and disposal of the said estate, and first it is my desire and will that the best and principal house wherein Mrs. Butler lately dwelt be always a habitation and dwelling-house with all that appertains to it for the minister and his family who dispenses the Word of God and the Sacraments at the Dissenters' Chapel near adjoining to Bradford. It is likewise my desire and will that out of the rents and profits arising out of the houses and land constant care be taken that the value of — in bread be distributed every Lord's Day at the said Dissenters' Chapel to such poor people as attend duly and constantly at the said Chapel after all the assessments and taxes imposed upon the said estate are fully discharged. And I do constitute and appoint my said grand-neice, Faith Sawrey, my Sole Executrix of this my last will and testament.

In witness whereof I have herein set my hand and seal

Sept. 25, 1742. John Topham, of Bradford, made oath before me that ye words Abm. Sharp, at the beginning and twds. the latter end of this will were the proper handwriting of the testator, and doth believe that the whole will above written was the proper handwriting of the said Mr. Abm. Sharp.

B. KENNETT, *Sur.*

Administration granted May 9, 1768, to Hannah Gilpin, residuary legatee named in the will of Faith Sawrey, decd., of all the estate of the late Abm. Sharp by his will above.

There are two blanks in the will, which are indicated in the copy. Mrs. Faith Sawrey enjoyed the estate until her death in 1767, and bequeathed it by will to her niece, Hannah Gilpin, and it was to the latter that administration was granted.

The relics of a genius such as Abraham Sharp undoubtedly was, unlike those of many distinguished saints and martyrs, appear to have been little cared for. As previously stated, his papers and many other evidences of the Sharp family were allowed to be used as fire-paper, and when Mr. Hailstone became tenant of Horton Hall the bulk of them were stored in an outhouse in the garden, trampled underfoot by any clown who entered. The following copy of an inventory of Mr. Sharp's instruments and work-tools, probably made after his death, has been secured. We are unable to add any information as to the prices attached. Our concern was more to ascertain what instruments were still in existence, and, if possible, to trace their whereabouts. This quest has been but indifferently successful. Many of the instruments with historic associations have been utterly lost, and the materials of others have had narrow escapes of being put to debased uses. A few only are known to be in safe keeping.

INVENTORY OF MR. ABM. SHARP'S INSTRUMENTS
AND WORK TOOLS.

	£	s.	d.
A Portable Semi-quadrant with Telescope Sights 42 ins.	0	15	0
Armillary Sphere Brass	3	00	0
Analema Quadrant, Brass 16 inches radius $53^{\circ} 51''$...	0	18	0
A Small Brass Quadrant $5\frac{1}{2}$ ins. radius	0	5	0
A Brass Quadrant $7\frac{1}{2}$ radius Lat. $53^{\circ} 51'$	0	5	0
A Double Horizontal Dial, Lat. $53^{\circ} 55'$	0	3	6
An Universal Quadrant	0	10	0
A Small Brass Analéma	0	1	0
1 Fine large Double Sector	2	02	0
A Telescopical Sphæra Armillaris	4	04	0
Fine Micrometer	0	10	6
Small Analéma Quadrant, Telescope Sights	0	15	0

	£	s.	d.
Fine Surveying Wheel	3	00	0
4 Telescopes			
Large Quadrant, 6 Foot radius	1	00	0
Hunt's Slide Rule	0	07	6
Brannan's Rule, 3 foot long 4 laps	0	01	6
Brass Dyal	0	02	6
Brass Quadrant, 5 ins. radius Lat. $53^{\circ} 51'$	0	05	0
3 Brass Diagonal Scales	0	02	6
1 Cane with Telescope Sights in the Handle ..	0	05	0
1 do. do. do.	0	06	0
1 do. do. do.	0	05	0
1 Clockmaker's Dividing Plate, diamr. 11 ins. ...	0	04	6
1 Sutton's Quadrant, small one	0	00	6
1 Protractor	0	00	2
1 Pocket Way Wiser	0	15	0
1 Micrometer	0	02	6
1 Brass Scale, a thin one	0	01	0
2 Scales	0	01	0
1 Mettle Concave Mirror	0	05	0
1 Double Microscope	0	10	0
1 Brass Sector	0	00	8
1 Fine Dividing Plate 26 ins. diamr.	1	15	0
1 Double Horizontal Dyal of Stone	0	01	0
1 Small Brass Double Sector	0	01	6
1 Ivory foot Rule with Pencilling Compass at the end...	0	01	6
1 Little Brass Sector with Qudrt.	0	02	6
Quadt. with Telescope sights and Reclining Pedestal...	1	00	0
Case of Drawing Tools	0	02	6
Box Surveying Scale 2 foot long	0	02	6
3 Box Surveying Scales a foot long each	0	02	6
1 six Inch Box Scale	0	00	2
1 Foot Box Rule	0	00	2
1 Fine large Loadstone	2	02	0
3 pr. of Beam Compasses, Iron	0	05	0
Surveying Scale one foot long	0	00	6
3 Wood Rules	0	00	6
1 Brass Square	0	00	6
1 Foot Box Surveying Rule	0	00	3
1 Steel Gauge	0	01	6
1 Spt. Level	0	00	6
1 Steel draws. Bow... ..	0	01	0
3 Watch Springs	0	01	6
1 Pr. of Sights for Plain Table	0	02	0
Center for Quadrt. Steel Bow			
Stand Vice Brass	0	00	2
Wood Draws. Bow... ..	0	00	4

	£	s.	d.
Money Weights	0	02	0
2 Oyl Stones and Rag Whetstone	0	01	6
Tobacco Box and Cross Staff Head	0	00	4
1 Pr. Large Iron Beam Compasses	0	01	6
4 pr. Dividers	0	02	0
3 pr. Pliers	0	00	6
2 pr. of little Shears	0	00	2
2 Shoemaker's punches	0	00	4
Large Smith's Vice... ..	1	01	0
15 plates (or platers)			
22 Doz. Files	1	10	0
1 pr. Large Screw Stocks	1	00	0
1 pr. of do. less kind	0	10	6
200 Taps at 2d. each			
Parcel Shraff Brass, 8d. per lb.			
Do. plate Brass, 12d. per lb.			
Old Lead, 1½d. p lb.			
20 Drills	0	02	0
Old Iron, 1½d. p lb.			
Box Wood Lignum Vitæ & Cocoa Wood	0	16	0
Box of Telescope Glasses			
Hand Vice	0	01	0
1 Pr. of Wire Drawers, Tongs			
Cane with Brannan's Ruler	0	10	6
1 Two Foot Telescope	0	02	6
6 Old Wood Quadts.	0	01	0
2 Old Swords	0	03	0
3 Old Canes... ..	0	03	0
2 Walking Sticks			
Box of Shinods			
Inkhorns			
Ivory			
Brass Wheels for Prick Lines	0	00	4
Large Burning Glass	0	05	0
One do. Less... ..	0	02	6
Single Microscope	0	01	0
1 Single Magnifying Glass	0	00	8
1 Small prospective in Bow	0	01	0
1 do. Br—it (crossed out part)	0	00	6
Double Smoaked Glass	0	00	6
Do. Ivory	0	00	6
Curious Set of Solid Bodies No. 24			
24 Hours Clock 1 Wooden Case... ..	0	18	0
1 Small Smith's Vice	0	03	0
1 Anvill	0	02	6
1 Pointing Anvil	0	00	6

	£	s.	d.
1 Tom Chimer & Saw	0	01	0
1 Hand Saw... ..	0	01	0
Bow Saw	0	01	0
Stock Shears 2 pr.	0	05	0
2 Whimbles	0	01	0
Beef Ax	0	00	8
Hatchet	0	00	6
Small Smith's Vice... ..	0	03	0
1 do.	0	04	0
1 pr. Smith's Tongs... ..	0	01	8
Small Whimbles & Clock Makers Hand throw	0	03	0
Book Binders Beating Hammer	0	01	0
14 Gimblets	0	00	6
2 Chisels	0	00	4
5 Whimbles Small ones	0	00	5
2 Lock Saws	0	00	2
1 Doz. Engravers			
1 Box of Letters &c.	0	04	6
Iron Frame	0	00	6
2 Hammers	0	00	6
A Box of Prickers	0	00	6
Pr. of Smith's Bellows	0	10	6
Anvil in a Stock	0	10	0
Lignum Vitæ 1d. p lb.			
Cocoa 1 ½d. p lb.			
Boxwood 2d. p lb.			

The following interesting communication on the mechanical productions of Abraham Sharp was made by the Rev. N. S. Heineken, of Sidmouth, to the *Edinburgh Philosophical Magazine* in the year 1846. It contains the most complete reference to Sharp's instruments extant:—

SIDMOUTH, November 23, 1846.

It may perhaps be interesting to some of the readers of the *Philosophical Magazine* to be informed that several of the mechanical productions of Abraham Sharp, the once celebrated assistant of Flamsteed, are still in existence and in good preservation. My attention was directed to this subject in consequence of observing his name mentioned in the review of the Rev. W. Whewell's "Flamsteed and Newton." Feeling interested in everything which related to one so eminent in his day, I endeavoured while on a visit to Bradford (Yorkshire) to obtain whatever information I could respecting the papers and "relics" of the once

"indefatigable calculator," and sought to procure some memento of him who is described by his biographer as having "had a clear head for contriving and a skilful hand for executing" any of the mechanical or philosophical apparatus which he required. The result of my inquiries I subjoin.

The lathe mentioned in the *Encyclopædia Britannica* (article Sharp) for turning rosework, eccentric, swash work, geometrical solids, &c., was sold some few years since at Bradford to Godfrey Wright, Esq., living in the neighbourhood of Doncaster. It had for many years been used by its former possessor (W. Goodchild), and when I saw it was in excellent working order, and many are the elaborate and beautiful specimens which I have seen of its efficiency, even at a period of upwards of a century after it was first constructed. Another smaller lathe of a somewhat similar description for turning ovals, and ovals combined with rosework, which exhibits some ingenious contrivances of the same "master mind," was purchased by a person named Murgatroyd, residing at Heaton, near Bradford. The double sector mentioned in his biography and sculptured on his monument, is, I understand, in the possession of J. Bottomley, of Bradford, or his relative, Miss Bamforth, of Manor Row, Bradford. The large (18-inch) elaborate ring dial, and also the set of calculating rods in a walking-stick, were purchased by Mr. Muff, music seller, Leeds. A beautifully-divided plate for calculating, I was informed, was in the possession of C. Skelton, Esq., of Bradford. A large equatorial (with the hour circle 30 inches diameter), in complete preservation, was purchased at the sale at Bradford, and is now in the York Philosophical Institution.

A very ingenious and complete perambulator,* measuring from part of an inch to 100 miles, together with some geometrical solids turned in the first-mentioned lathe, now belong to my friend, J. Waterhouse, Esq., of Well Head, near Halifax.† Of this perambulator, I may observe that

* The term "way-wiser" (see pp. 59, 62) seems to have been Mr. Sharp's fancy name for the instrument, which was afterwards and is still called the "Perambulator."

† From the Journal of the Royal Astronomical Society for February, 1880, we gather many interesting particulars regarding Mr. John Waterhouse, F.R.S. He was the representative of a family which for 400 years had been intimately connected with Halifax. Very early in life he evinced a taste for scientific studies, and a certain weakness of constitution, which prevented him indulging in great physical exertion, seemed to stimulate his mental activity, and when in the course of a voyage round the world in search of restoration to health, he was enabled to record his observations in a journal which is a store-house of scientific facts, but which his modesty prevented from being published. At Well Head he established an astronomical and meteorological observatory, and in connection with the latter, published a complete work on the "Meteorology of Halifax," which may be regarded as a model for all such local observations. Practical botany also engaged his attention, and his gardens were distinguished for the treasures they contained, but his favourite studies were astronomy, geology, electricity, had a good many costly apparatus for showing the effects of polarised light, and in connection with the latter he was identified with the early progress of photography. He was also much interested in microscopy, and was himself a skilful observer and manipulator. He was also a good mechanic, and had a room full of lathes, chucks, &c., some of which were of Abraham Sharp's making. He was also a skilful player on the violoncello; indeed, he seemed to be able to turn his hand to any pursuit of an intellectual character. He was one of the founders of

it has only one toothed wheel in the whole of the machinery, all the intermediate measures are given from the inch to the last index, which moves once in 100 miles, and yet the disc of the dial is not more than about six inches in diameter, and not a quarter of an inch in thickness. Of this perambulator I have a model, which (with the consent of my friend) I will submit to you should you desire it. A mural quadrant of $5\frac{1}{2}$ ft. radius, diagonally divided, &c., I have in my possession, and shall feel pleasure in showing it any who may feel an interest about it. A spirit thermometer, the scale of which I am certain was the work of Abraham Sharp from the punches used for the figures, was fixed in the wainscot of the Hall at Horton (his residence). If the tube is the original one, this might be valuable for reference in a meteorological point of view, for I remember having seen many meteorological journals which had been kept by Abraham Sharp, and which were among the papers left at Horton Hall. These, I believe, are now in the possession of E. Giles, Esq., the representative of the family. Two planispheres were also among these papers, drawn by pen and ink, but so exquisitely that, until I examined them with a magnifying lens, I could not but believe them to be engravings. A vice, which was made to turn on its axis, and which had the contrivance of a second pair of chaps near the screw for pressing, I imagine, horn into moulds for buttons, was used by the before-mentioned Mr. Goodchild as his working vice, and I dare say it is still retained by some part of the family. As I have mentioned the contrivance for horn-pressing, I may state that even one set of these identical buttons is still in existence, with every variety of rosework patterns, and were probably intended by the philosopher for his holiday suit!!! They are now, together with some lenses, regarded by their owner, Mr. Fearnley, of Shipley, as precious relics, though I believe within a few years they have decorated modern broad cloth. The steel punches for figuring his instruments were constantly used by Mr. Goodchild for the same purpose, as were also several chisels which, singularly enough, were made of remarkably soft iron, case-hardened at the cutting part. I remember also to have seen a shutter micrometer of brass at the hall. This, I suppose, not having been sold, is retained by E. Giles, Esq.

It is much to be regretted that the ingenious and laborious productions of such men should be thus scattered abroad, and, in too many instances, allowed to decay or be wantonly destroyed. It was by chance only that I was fortunate enough to save the large mural quadrant from the hands of an ignorant brazier, who was anxious to purchase it for the purpose of mending kettles! I was given to understand that, with respect to his MSS., that many years since, when they had been neglected by the owner of the house and left in a closet, the cook was in the habit

the Halifax Philosophical Society, and enriched its museum with many specimens. He was a fellow of the Royal Society, of the Royal Microscopical Society, and of the Geological Society. Mr. Waterhouse died in February, 1879, in the seventy-second year of his age.

of supplying herself from the ample store for the purpose of lighting fires and singeing fowls; what remained have since, I believe, been carefully preserved by E. Giles, Esq., but they are now the *membra disjecta*, the Sibyl's scattered leaves.

I am, gentlemen, respectfully yours.

N. S. HEINEKEN.

P.S.—One of the philosopher's walking canes, having its crutch head formed into an opera glass, I also saw at the hall, and I hope it is still preserved.

In the *Philosophical Magazine* for 1847 is a paper by the Rev. N. S. Heineken on "Abraham Sharp's Mechanical Productions." Numerous instruments are mentioned, and among them the quadrant which Mr. Heineken was so fortunate as to secure from a tinman who was about to use the material as old brass for the repairing of kettles. Mr. Heineken liberally offered this relic to the Royal Observatory, with the expression of his hope that it might be preserved there with the care usually given to instruments of historic interest. The Astronomer-Royal (Professor Airey) had no difficulty in making this engagement so far as his personal control extended, and the instrument was immediately sent from Mr. Heineken's residence, at Sidmouth, to Greenwich. Mr. Heineken pointed out that one piece of wood was wanting; this was supplied at the Royal Observatory, and in this state of comparative completeness the quadrant was exhibited to the society in 1865, a description appearing in the society's monthly notices as follows:—

The wooden frame of the quadrant consists of three radial bars of oak (of which two are at right angles, and the third, supplied at Greenwich, makes angles of 45° with the others), and two arch pieces of oak, one of about 50° and the other of about 60° , whose ends meet in the middle of the quadrant, with mortice and tenon connection, but without any double curb structure or frame for breaking joints. Upon the three wooden radii are three iron radii and four other iron braces and connecting pieces, screwed to the wood by iron screws tapped into the wood. There is also an iron band (in two pieces, united by an intermediate piece) surrounding the wooden arch, and to this band the brass arch is attached by ten angle irons. The brass arch itself is made of very thin

sheet brass; it is ten inches broad in the middle and somewhat broader nearer the ends. It is composed of four pieces; two of the unions (near the two ends of the arch) are of dove-tailed or embattled ends, brazed together (as in the old Greenwich quadrant). The central union at 45° does not appear to be brazed; the union seems to be effected by rivetting the two parts to an iron plate below. A hole, corresponding to the centre of the graduated circular arcs, was discovered in a small piece of brass which is let into the edge of one of the radial iron bars. This hole is only about $\frac{1}{4}$ in. in diameter; it does not appear to have ever had any centre work on which a wider telescope could turn. Upon the sheet of brass are several graduated circular arcs, one of which is partly cut away by the form given to the interior edge of the brass sheet, but the finished graduation band, 1 in. broad, very near the exterior edge of the brass sheet, its inner radius being about 4 ft. 11 in. and its outer radius about 5 ft. Its graduations extend at one end about 3° beyond the quadrant, and at the other end about 14° beyond the quadrant. Each degree is divided into twenty parts, $3'$ each at the exterior and interior defining curves of the band, and the graduation points are connected by diagonal lines. Four intermediate circular arcs divide the breadth of the band into fine parts, so that with a radius properly shaped an arc would by eye be read to $36''$. The diagonal lines are very well cut, but are not (as stated by Smeaton) comparable to those on the Greenwich quadrant. Some bolt holes in the wooden radius seem to make it probable that it has been fixed to a wall. But there is no appearance that it has ever carried an index or movable radius. The frame throughout is miserably weak, and it appears very strange that an experienced workman should have connected such a careful graduation with such a feeble basis, whatever the purpose for which it was to be used. [May we not conjecture that *the frame* was only made for temporary use, or was intended to be strengthened by metallic bands.]

This relic, we are informed, is still preserved at Greenwich Observatory, and, so far as is known, it is the only specimen of Sharp's handiwork contained in that institution. Although some portions of the instrument are rude and rough, the important parts, the graduations upon the limb of the circle, are exquisite, especially considering the method (entirely by hand, no such thing as a dividing engine being then in existence) by which they were executed.

The "universal quadrant," referred to in the above inventory, and described in Mr. Heineken's letter as a "beautifully-divided plate for calculating," is in fine preservation in the museum of the Royal Astronomical Society, London. It is a plate

8 inches square, ruled on both sides with lines and scales, and provided with a movable bar to work on a pivot in the centre or corner of the plate. The instrument was used for finding the sun's altitude and azimuth for any latitude—the place of the sun and the hour being given; for finding the times of the rising, setting, or southing of a planet; and for making other astronomical calculations. It was both invented and engraved by Abraham Sharp, and for beauty of workmanship is one of the most remarkable specimens of his handiwork. It was originally in the possession of Mr. Jonathan Priestley.* In 1835 Mr. Charles Skelton, of Bradford, obtained possession of it, having purchased it from Mr. Muff, of Leeds, for £5. (In the inventory given above it is valued at 10s.) The quadrant was presented to the Royal Astronomical Society by Mr. Shearman.

The lathe referred to as having been purchased by the Rev. Godfrey Wright is also in existence, or a portion of it. In a letter received from C. B. E. Wright, Esq., of Bolton Hall, near Clitheroe, the present representative of the family, and dated June, 1888, he says:—

I have several pieces of ornamental work done by Abraham Sharp, and have also the remnant of his old lathe and rose engine (which I understand he invented); also a rude geometric chuck, and a scroll chuck similar in principle to what has lately been introduced as the American scroll chuck.

The large equatorial in the York Philosophical Museum, of which the honorary curator is the Rev. Canon Raine, is also in excellent preservation. This telescope was lent by the York Philosophical Society towards a collection of scientific apparatus exhibited in 1876 at South Kensington. Mr. Hailstone possesses many examples of Abraham Sharp's handiwork turned by the lathe, and also a number of mathematical instruments and other scientific apparatus.

* See reference to the Priestley family on p. 165.

Among his collection is the philosopher's walking cane, having the head formed into a telescope. The large elbow barometer and thermometer referred to in Mr. Heineken's letter, and seen by him at Horton Hall. Mr. Hailstone presented it to the York Museum.

The following letter from the late William Richardson, F.S.A., must close this section of our work. The writer was a distinguished student of and lecturer on natural philosophy, for several years under the auspices of the Society of Arts, and some time farmed a little land at Holme Top, Little Horton. His letter, among other things, opens up the interesting inquiry as to whether Sir Isaac Newton was, as he states, a visitor at Horton Hall. We much doubt whether that was the case, or some reference would certainly be found to the event in Sharp's exhaustive memorandum books. We have, however, searched in vain for any such reference. The fact of the great philosopher having been a correspondent of Abraham Sharp is vouched for on the authority of an attorney in Bradford, who had the inspection of Mrs. Giles's papers, and who saw several letters from Sir Isaac Newton addressed to Mr. Sharp among them. Unfortunately they have not been available for the purposes of this work. Mr. Richardson's letter is as follows:—

HIGH FIELD, SOUTHOWRAM, *June 1, 1857.*

To Edward Hailstone, Esq.,

DEAR SIR,

In reply to yours of May 20, I have to say that my authority for making the statement as to Sir Isaac Newton visiting old Mr. Abraham Sharp was Francis Sharp Bridges, Esq., a collateral relation of Mr. Sharp. I had some business when he bought the farm which I was then farming at Little Horton, and he detained me till after midnight in relating anecdotes of the visit, and also of the visit which Mr. Sharp returned, and the numerous friends that Sir Isaac introduced him to in London, and many others.

I dare say Mr. Hailstone will see the description about the matter when Mr. James brings out his "History of the Trade of Bradford." I have no doubt, from what Mr. Bridges told me, that the chuck and wheel

work which Goodchild, that I know looked at, but could not make out, was a *geometric chuck*, and beyond the comprehension of the men whose hands it fell into, and was sold, at least many of the wheels, for old brass. What I have since seen of a geometric chuck leads me to think so. I am in possession of his eccentric chuck, which I have no doubt Sir Isaac Newton and Mr. Sharp have had many a pleasant hour with.

Yours most sincerely,

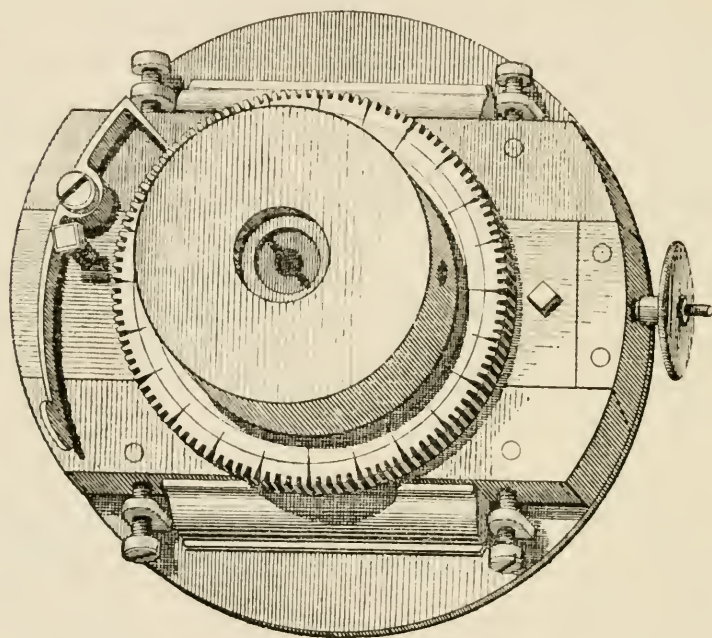
W. RICHARDSON.

Fortunately we have been able to secure a drawing of the eccentric chuck referred to by Mr. Richardson, and which was at one time in his possession. It is now the property of John Waugh, Esq., C.E., of Bradford, and it is through his kindness that we have been able to obtain a drawing and also a description. This interesting relic is considered by its owner a marvel of ingenuity considering its antiquity; and this opinion is shared by Mr. J. H. Evans, of Wardour Street, London, one of the first authorities on lathe construction in England, who, having examined this eccentric chuck, has kindly prepared the following description of it for publication in this volume.

Mr. Evans writes :—

The illustration is of an eccentric chuck, the manufacture of which dates back as far as the year 1689, two hundred years ago, and considering its comparative antiquity, the principle upon which it is constructed more or less coincides with those made at the present period. Judging from the specimen which forms the subject of this illustration, the great advance claimed by our leading manufacturers at the present time is largely due to the superiority of workmanship for which so many facilities are now offered, together with improvements in the design and construction, rather than any specific alteration in the principle upon which the chuck is made. Having thoroughly examined the chuck, and making allowances for what we may duly consider a total absence of any such tools as are now employed, it can only be deemed an excellent piece of workmanship; the parts are all well-fitted and fairly accurate. It consists of a circular plate of cast iron, with a boss at the back which has been screwed to fit on to the lathe or machine upon which it was used. A cast iron slide, having single chamfer, is then fitted to slide between two bars of the same material with corresponding angles. These are held to the plate by screws from

the back. At the side of the bar a rather elaborate moulding is attached, which appears to be for the purpose of giving a broader base for them to rest upon. These, however, are cut away at each end to make room for studs, which are firmly screwed into the plate, and through which steel screws are also fitted to act as set screws to adjust the slide when necessary. A main screw of indefinite value is fitted to move the slide to the desired eccentricity. On the front of the main slide a wheel is fitted to move on a pivot, and is divided on its edge into 120 teeth, having a click which falls into one of the teeth at the



desired point to arrest its further revolution. The front of the wheel is provided with a screw to correspond, no doubt, with the lathe or engine upon which many years ago it was used. This click wheel is now replaced in modern chucks by a worm wheel and tangent screw, which gives a more accurate division, and is capable of being multiplied into practically any number. It is extremely interesting to meet with such a good specimen of workmanship, which must have been made, under any circumstances, without the aid of the various tools that are now employed by our best makers. The subject of the illustration is

also in a very excellent state of preservation considering the vast number of years of its existence. Seeing the cement which is upon the face of the wood chuck on the nose, it is evident that if this is as old as the chuck, that the mechanics of two hundred years ago were not deficient in the knowledge of the different means of attaching the materials to the various instruments employed.

It is Mr. Waugh's intention to place the chuck in the care of the Bradford Corporation, to be placed in the Museum of the Bradford Free Library.

MEMORIALS
OF THE
SHARP FAMILY
AND ASSOCIATED FAMILIES

CHAPTER VII.

JOHN SHARP, PARLIAMENTARIAN.

His birth in 1604—A clothier and merchant—Steward of the rectorial tithes of Bradford—His activity on the side of Parliament during the Civil Wars—The siege of Bradford—Disastrous results to the town—Fairfax and the Western campaign—John Sharp accompanies him as financial secretary—Extracts from his account book—Close of the campaign—Sharp receives two certificates with gold medal from the Parliament—*Fac simile* of certificate of 1647—Domestic life of John Sharp—His death in 1672—Copy of his will.

John Sharp, the father of Abraham, the mathematician and astronomer, was evidently a man of no mean position, socially and intellectually, and well represented the elder branch of the family whose name he bore. He was born in 1604, at Little Horton, and was the eldest son and heir of Thomas Sharp. He was called John Sharp, junior, in divers instruments from 1633 to 1651. At the assessment of the subsidy granted 16 Charles I. (1640) his lands were valued at 20s. By indenture 15th August, 1639, he sold the tithe of corn, &c., upon certain lands in Horton to his uncle, John Sharp (the Royalist), he having received a grant of them from Sir John Maynard on October 1st preceding. He was secretary to General Fairfax during the whole of the Western campaign in the Civil Wars, and received two certificates in

1645 and 1647, with gold medal, from Parliament and the City of London for his good service.

During the Commonwealth assessments were periodically levied upon the country for the support of the army and navy. As one of the rewards for his services to the dominant party, John Sharp obtained the post of collector for a large district in the neighbourhood of Bradford. He was also agent to Sir John Maynard, the lay rector of Bradford parish, and collected the manorial tithes. Lady Maynard rebuilt the east end of the Parish Church, and in the gable there used to be a stone, with the initials *M. M.*, and the Maynard arms in a lozenge. It was taken down at the restoration of the church.

John Sharp was also a clothier, and, in all probability, a merchant clothier as well. Among the witnesses called in an Exchequer suit in the year 1637, to determine the rates leviable by the aulnagers (measurers) upon the clothiers in regard to "Northern Kersies," was John Sharp, the other master clothiers from Bradford being William Greene, Henry Bradshaw, William Jowett, John Horton, Richard Smith, Thomas Baume, and William Bailye.

In olden times these "kersies" must have had some reputation, for in a letter sent by a Mr. Robert Graham, of London, in 1695, to Abraham Sharp, the mathematician, of Horton, he says :—

SIR,

I have taken the liberty to trouble you, having occasion for a considerable quantity of kersies, and, understanding that you live near to where they are made, I have enclosed patterns of such as I shall need. The red to be whole thicks, the blue half thicks. I am told they may be had of Mr. Stansfield, at Bradford, or Mr. Josiah Stansfield, at Sowerby Dean, or elsewhere. If you can find any such goods pray send me patterns, with weight, breadth, length, and lowest price to be paid on delivery of the goods.

The textile manufactures of the country suffered sadly during the Civil Wars, and in Bradford and other places the cloth trade was almost extinguished.

John Sharp's educational training must have been of a superior character, as is shown by letters and other documents prepared by him, which are still extant. He married Mary, the daughter of Robert Clarkson, of Fair-gap, Bradford, sister of the Rev. William Clarkson, Rector of Adel, and had a numerous family. His wife, judging by existing evidences, was a woman of considerable culture.

John Sharp was undoubtedly a prominent local character during the Civil Wars. His sympathies were strongly on the side of Parliament during the fierce struggle which then prevailed. Joseph Lister, the historian of the siege of Bradford, and an apprentice with John Sharp, has left an account of the part taken by his master in breaking through the Royalist soldiery when the town was besieged, and the sacking of the town after being taken by the Earl of Newcastle is also vividly described by Lister. In Markham's "Life of the great Lord Fairfax" there is an elaborate account of the entire campaign.

The officer who was chosen by Lord Newcastle to enforce submission from the stubborn clothing towns was Sir William Savile, of Thornhill, who collected a body of foot from his estates along the banks of the Calder, and, with some troops of horse, advanced into the West Riding. Leeds and Wakefield submitted without a struggle, and he then prepared to reduce the intractable people of Bradford to submission.

Bradford lies in a deep funnel-shaped hollow, surrounded by hills, and three streams unite in the bottom, which form Bradford Beck, flowing into the river Aire at Shipley. In those days the town consisted of three streets and a few lanes. Approaching from the east the road descended the hill, leaving Bowling Hall on the left, and entered the town at Goodman's End, running east and west. The market-place separated them, whence Kirkgate ran north-east to the fine old Parish Church, with its great solid square tower, ninety feet high. A street, called afterwards Dead Lane, from the

heaps of slain, connected Goodman's End with Kirkgate near the church, and Barkerend was directly in the rear of Dead Lane.

The people, both of Bradford and the surrounding villages, were thriving clothworkers and red-hot Puritans. But if they could pray, the cavaliers soon found out they could fight too. Sir William Savile threatened fire and sword if they did not submit, and only about ten days after the battle at Tadcaster a body of 700 Royalists pitched their tents at Undercliffe, on the common near the town. Next day they advanced closer, and began firing their cannon into the town. Then one of the guns burst, and a tremendous snow-storm came on, which obliged the assailants to return to Leeds. But the respite was only for a day or two. On Sunday, December 18th, Sir William Savile appeared in person on the hills to the eastward with five troops of horse, six of dragoons, and 200 foot. They advanced with colours flying in the air and sounds of warlike music—"a tremendous sight, enough to make the stoutest heart tremble," says Joseph Lister, who was an eye-witness. But there were stout hearts assembled in the Parish Church on that Sabbath morning, and a resolution was taken to defend it to the last. They would have enough to do! The Royalist forces advanced to Barkerend, about 300 paces from the church, on higher ground, and there raised a battery and opened fire, while their musketeers occupied some houses near. The Bradfordians stationed their surest marksmen in the steeple, which they strengthened by hanging woolpacks round it, and disposed the rest of the men in the best way they could to defend the approaches, while messengers were sent in all directions to Halifax and the villages in Airedale to beg for assistance. These messengers arrived while the people were in church during morning service, and in many places the ministers stirred up their congregations from the pulpit to hurry at once to the rescue. Sir William Savile and his

officers were astonished. They had expected almost immediate submission from the townspeople, and instead of that their own disciplined troops were thrown into confusion. Captain Hodgson, with an armed body from near Halifax, gave them no time to recover from their surprise. He led the men of Bradford and Halifax on, and they rushed into the ranks of the enemy, fighting without any order, but resolutely and hand to hand. The hottest work was in the lane leading from Kirkgate to Goodman's End, since called Dead Lane. Late in the afternoon the Royalists drew off and retreated to Leeds, followed for some distance by the hitherto despised clothworkers.

When the news of the extreme peril of Bradford reached Selby, Sir Thomas Fairfax could no longer restrain his impatience to cast in his lot with its valiant defenders. With his father's sanction, he started one night towards the end of December with 300 foot and three troops of horse, passed through the Royalist lines, and reached Bradford next day—"a town very untenable," says Sir Thomas, "but for their good affection to us deserving all we could hazard for them." The news that the "Rider of the White Horse," as Sir Thomas was called, had come to command the well-affected in the West spread like wildfire from village to village, up the vales of the Aire and Wharfe, and over the hills to Halifax and Dewsbury. Men, armed with clubs and scythes fastened to poles, came crowding into Bradford, and valiant Captain Hodgson, who was on the point of going home again to Halifax, changed his mind, and resolved to serve permanently under the banner of the brave Fairfax. Yet the cause of the Parliament was almost desperate in Yorkshire, and it was due entirely to that peculiarly English trait of the Fairfaxes—their utter inability to understand when they were beaten—that it was kept above water at all. Lord Fairfax was shut up in Selby, without money or means of obtaining supplies; his raw levies were undrilled and

without experienced officers ; and Newcastle, with a vastly superior disciplined army, was master of the open country. This seems to have been the scene of the first of the Civil War conflicts, at least in the northern counties, for Fairfax commences his memoirs with saying, "*The first action* we had was at Bradford."

Lister, in his account of the above fierce encounter, says : "I remember one day they came to a hill called Hundercliffe, and brought two great guns with them, and planted them directly against the steeple, where we had men with several long guns that did much execution when they came within our shot ; but God so ordered it that a snow shower fell just then, and one of the great guns burst, which so disheartened them that they went away of their own accord." The enemy "planted two drakes, which they had brought with them, in a barn, from which they fired at the church, where the Bradford men defended themselves till towards mid-day, when some men from Halifax came to their aid, then they sallied out, and drove the enemy away." The marks of the shot are said still to be seen in the steeple of the church. One of the Bradford men, before the others issued from the church, had shot the "master-gunner" with a fowling-piece, which had already daunted the enemy. The Bradford men were as yet in such an ill condition of defence that, in the pursuit, they were armed with "swords, sithes, long-poles with sickles fastened to the end of them, flayles, spits, and such like weapons."

Lister also says :—"Another day they (the Royalists) came down into Barker End, a place within a very little way of the church, and they placed their guns directly against the steeple ; and they were also in a line with a street called Kirkgate, and would probably therefore have done a great deal of mischief in the town. In the next place, a stout, gallant officer, commanding a company of foot, came running down a field shaded with a hedge, intending to come running

into the church, and so cut off the men both in the church and steeple; but the men in the steeple having a full view of their design, ordered a man to meet them and give them no quarter." The townsmen fired, and the officer was killed.

The champion of the Royalist party having fallen, his men were easily driven back. So suddenly did a panic strike them that, as Lister says, they "immediately ran away to Leeds, their den; and the townsmen fell in the rear of them and some little skirmish was made, and some little work was done, but not much."

We now proceed with that part of the history of the Civil Wars which brings us to the second siege of Bradford. On this occasion the Earl of Newcastle was in command of the Royalist forces. The following is the account given by Lord Fairfax himself, as it appears in his *Memoirs*, pp. 46-50:—

The Earl of Newcastle spent three or four days in laying his quarters about the town of Bradford, and brought down his cannon, but heeded not to raise batteries, for the hills within half musket shot commanded the town. Being planted in two places, they shot furiously upon us, and made their approaches, which made us spend very much of our little store, being not above twenty-five or twenty-six barrels of powder, at the beginning of the siege. Yet the Earl of Newcastle sent a trumpeter to offer us conditions, which I accepted, so they were honourable for us to take, and safe for the inhabitants. We sent two captains to treat with him, and agreed to a cessation during that time; but he continued working still, whereupon I sent forth the commission again, suspecting a design of attempting to meet something upon us. They returned not until eleven o'clock at night, and then with a slight answer. Whilst they were delivering it to him we heard great shooting of cannon and muskets; all run presently to the works, which the enemy was storming. Here for three-quarters of an hour was very hot service, but at length they retreated. They made a second attempt, but were also beaten off; after this we had not above one barrel of powder left and no match. I called the officers together, when it was advised and resolved to draw off presently, before it was day, and retreat to Leeds by forcing a way, which we must do, for they had commanded the town. Orders were despatched, and speedily put in execution. The foot, commanded by Colonel Rogers, was sent out. It sought some narrow lanes, and they were to beat up the dragoons' quarters and so go on to Leeds. I myself, with some other officers, went

with the horse, which were not above fifty, in a more open way. I must not forget my wife, who ran the same hazard with us in the retreat, and with as little expression of fear; not from any zeal or delight in the war, but through a willing and patient suffering of this undesirable condition. I sent two or three horsemen before to discover what they could of the enemy, who presently returned and told us there was a guard of horse close by us. Before I had gone forty paces, the day beginning to break, I saw them up the hill above us, being about 300 horse. I, with twelve more, charged them; Sir Henry Fowles, Major-General Gifford, myself, and a few men brake through; Captain Mudd was there, and the rest of our horse being close by, the enemy fell upon them, taking most of them prisoners, and among whom was my wife, the officer, William Hill, behind whom she rid, being taken.

The spot where Lady Fairfax is supposed to have been taken was the present inn called the Cock and Bottle, in Barkerend. Not many days after the Earl of Newcastle sent Lady Fairfax back again in his coach, with some horse to guard her.

The Earl of Newcastle, having succeeded in his siege of the town, did not long remain there, but, leaving garrisons in Bradford and other towns, withdrew his forces.

The following certificate, copied from the Sharp MSS., presents a picture of the havoc committed by the Royalists, and also affords a view of the household economy of well-to-do yeomen of that date:—

We, whose names are subscribed, do certify that John Lister the father, and Joseph Lister the son, inhabiting in Horton, have been constant in their affections and actions for the Parliament, and lost at the taking of the town of Bradford by the Earl of Newcastle's army, on the 2nd and 3rd July, 1643, as followeth:—13 head of beasts, £41 10s. od.; one meare (mare) and two lodsaddells, £6; 3 ranges, £2 14s. od.; brass pots and pans, and other pans, £8 10s. od.; in pewter £10; six spits, 2 pare of racks, 2 iron dressing pans, and 4 ladells, £2; in apparel and cloth, £29 10s. od.; in wool and yarn, £10; in money, £16; in linen, £10; six feather beds, with blankits, coverlets, and hangings; flock beds, mattresses, with their furniture, £46; in ote meal, out of the arkes (chests); fourscore strokes with sacks and pack clothes, £13; other household goods, as cushions, buffets, chairs, and husbandry tools, £4; upon the public sale, £10; one mare put into Colonel Bright's troop with furniture, £5 13s. 4d.; free quarter (for soldiers), £72 4s. od.—Total, £288 4s. 6d. Signed, WILLM. THORNTON and others.

These Listers resided in a house on the site of Horton Low Hall.

After the siege of Bradford, John Sharp appears to have followed the fortunes of the Parliamentary General, Fairfax. He was present at the battles of Nantwich and Marston Moor, and after Fairfax was made Lord-General he became attached to his suite as paymaster and financial Secretary. So responsible and confidential a position would probably be suggested by the General himself, from his previous knowledge of the character and standing of the Puritan clothier of Horton Hall.

However that may be, evidence exists that Sharp went through the Western Campaign in the above capacity, which is furnished by a relic now in the possession of Mr. Hailstone. This is in the form of a pocket-book of 1646, full of household accounts relating to the General's expenditure, as well as expenses on account of the soldiery, which are in Mr. Sharp's handwriting. From many of the entries it would appear that Lady Fairfax also accompanied her husband on that occasion. From the chronological order of the several entries we are enabled to trace the General's course from place to place, commencing with the surrender of Bristol by Prince Rupert, in September, 1645. Fairfax, almost worn out with fatigue, went to Bath for a few days' rest. His march into Devonshire followed soon after, and in order to secure the line of the Exe, he established a chain of garrisons, commencing from Tiverton, and including Stoke. Thus, among the entries in the old almanack are the following :—

Pd. to Mr. Nevill that he gave the sentinel at Stoke	£	0	2	0
To the postilion's wages and towards hyring a horse				
to London	4	10	0	
To the apothecary for drugs	0	15	0	
To the pore	0	5	0	
To my Lady	1	0	0	
To the taylor for making of 2 wastcoats for my General	0	4	2	

To by fruit for my Lady	...	...	...	...	£0	6	0
To the butler for bere, bread, and candles	...	...	...	...	3	16	2
To a man who brought 5 quales to my Lady	...	...	...	...	0	2	6
For shambles meat	...	...	...	...	7	16	0
For carriage of 2 runlets of sack from London	...	...	...	...	1	10	0
For hay and straw	...	...	...	...	6	1	0
To a man for wood, 500 fagots	...	...	...	...	2	10	0
The butcher, a bill	...	...	...	...	43	16	0
The farrier's bill on the march to Dartmouth and back to Tiverton	...	...	...	...	2	6	4
For the butler's bill (being a part of the £20 he had to buy wine at Lyme)	...	...	...	...	5	7	0
To Mr. Nevill, his charges from Tiverton to Dartmouth	...	...	...	...	0	8	6
For fagots and furzes	...	...	...	...	2	13	0
For leaves and straw	...	...	...	...	2	15	0
To 2 quarts of cream	...	...	...	...	0	2	0
To my Lady Frances Fairfax to make up £30	...	...	...	...	5	0	0
To the General that he gave to a man that brought a letter	...	...	...	...	0	10	0
Paid to Mr. Richardson in full of his accompt with the General	...	...	...	...	7	15	0

On December 6th, Fairfax removed his headquarters to Tiverton, and remained there until the end of the year.

At the beginning of 1646, the Royalists were closely besieging the Parliamentary forces in Plymouth, and had strong garrisons at Exeter, Barnstaple, and Dartmouth. Fairfax's forces were recovering from an epidemic at Tiverton, and on January 8th, marched through the snow to Crediton, and, on the 16th, resolved to reduce Dartmouth, the best account of which is given in the General's own despatch to the House of Lords. Meanwhile, Lady Fairfax remained at Tiverton. After following the Royalist forces into Cornwall, the Parliamentary army caused Exeter to surrender, and on April 10th also reduced Barnstaple. The following entries in the Sharp MSS. refer to this period :—

To the farrier, from Jan. 29 to Feb. 4	...	...	...	...	£2	5	4
To the butcher	...	...	...	...	7	6	9
To a messenger, brought news to my Lady from the army	...	...	...	...	0	5	0

To Mr. Cadwell, brought news of the victory at Torrington	£0 10 0
To a cavalier taken at Dartmouth of kin to my Lady	0 10 0
To the footpost for carrying letters for my Lady ...	0 5 0
For rose water	0 3 0
For wood since the beginning of December ...	22 0 0
For 99 bushels of oats	13 16 0
For 2 load of hay	2 0 0
To Mrs. Fairfax when she went into Exeter ...	1 10 0
To the farrier	1 8 0
To the pore at Tiverton	1 0 0
To the saddler	2 0 0
To charges for 10 horses and servant ...	1 1 4
Paid at Winchester	2 7 3
To Mrs. Fairfax, she laid out to the musitians ...	0 10 0
For bringing a flitch of bacon from my Lady from Ringwood	0 5 4
For 4¾ yards of cloth	2 9 0
To Mr. Lloyd in full of his entertaynments ...	11 0 0
To the writing-master for teaching Miss Mary to write	2 11 8
To Lord John Norwood's servants, where the General dynd	0 15 0
To a man that brought a salmon	0 2 6
To Capt. Bland for a grey cropt mare	5 0 0
To the poor at Exeter	1 0 0
At Blandford, for horse charges and servants ...	0 11 0
To my Lord of Pembroke's gardener, who brought herbs at Salisbury	0 5 0
To a messenger that brought letters and a scarlet coat to the General	0 10 0
To the pore at Theominster, Newbury, and Andover	1 0 0
To a man that brought a cake and cheeses to my Lady from Banbury	0 6 0
To Mr. Chaloner for my Lady's use	47 0 0
For wood at Haddington	2 16 0
To the Quartermaster	37 0 0

The city of Oxford still held out, and on April 18, 1646, General Fairfax left Devonshire, and arrived before Oxford on May 1. He determined upon a regular siege, and on June 24 the Royalist garrison marched out of the city. Only a few scattered garrisons, such as Worcester, Wallingford, Raglan Castle, remained, and after the surrender of the latter on August 19th, Sir Thomas Fairfax stayed a day or two at

Chepstow, and returned to his wife at Bath. In October Fairfax had his headquarters at Cornbury House, in Oxfordshire. Meanwhile a glimpse at the domestic concerns of the warrior are given by a reference to the entries in the account book of his private secretary, John Sharp. Thus under date July, 1646, is the entry :—

To a nurse in Oxon for baby and lace for my lady... £6 5 0

That would be in connection with the birth of Little Moll.

To a talor in Oxon by my lady's order	...	...	£1 9 0
To the woman that cleans the rooms...	...	...	0 7 0
While we were at Oxford 32 days	...	...	4 12 0

The following entries are of a miscellaneous character, many of them referring to the travelling expenses in the West :—

The Quartermaster...	...	...	£31 15 0
To the butler of Queen's College	...	...	1 0 0
To the barber who trimmed my General	...	...	0 5 0
To my General at boules...	...	...	0 1 0
To my Lord Lovelace's servants	...	...	1 2 0
To the pore at Farringdon	...	...	5 0 0
At the inn at Cirencester for servants...	...	...	0 5 0
To Mr. Rushworth he had disburst for my Lady	...	...	4 6 0
To Miss Moll	...	...	0 2 6
To the trumpeters at the league (qy.) before Raglan	...	...	1 0 0
To the pore at Chepstow	...	...	3 0 0
Disburst by the way out of Wales	...	...	0 5 0
Which my Lady had in Wales	...	...	20 0 0
To a pair of boots for my General and a pair of slipps for my Lady	...	...	0 16 0
To Mistress Mary	...	...	0 1 4
For my Genl. on ye boulin green	...	...	0 2 0
To a lame soldear...	...	...	0 5 0
To Mr. Rushworth that he layd out for my General, viz., 5s. to the men at the bath, and 5s. to the Mayor's servants at Marlborough	...	...	0 10 0
To the waggoner from Bath	...	...	0 7 6
To Col. Lambert by the G's orders	...	...	40 0 0
To my Lord of Westmorland's man brought a doe to Cornbury House	...	...	1 0 0

Sir Thomas Fairfax Knight, Commander in Chiefe of all
the Land-Forces under the pay of the Parliament, within
the Kingdome of England, Dominion of Wales, and in
the Iſlands of Gernſey and Jerſey, in order to the ſecu-
ty and peace of the Kingdome, reducing of Ireland, and
disbanding ſuch as ſhall be thought fit by both Houſes.

I Doe hereby acknowledge, that Mr. John Sharpe
hath deſervedly received a Meddall from the Parlia-
ment and City of London, in remembrance of his faithfull
Service under my Command.

Given under my Hand and Seale at Kingſton, the
30. day of Auguſt, 1647.

J. W.

CERTIFICATE AND MEDAL.

(Granted to JOHN SHARP, the Parliamentarian.)

On November 12 Sir Thomas Fairfax returned to London, and was received with great enthusiasm. Some interest attaches to the following items in connection with his journey, and the expenses attending his triumphal entry into the Metropolis :—

London—the gunners	...	...	...	...	...	£3	0	0
My lord Warwick and they that came in with my								
General...	...	...	...	...	...	3	0	0
The pore at the Guildhall	...	...	...	...	...	0	5	0
A Bible for ye General	...	...	...	...	...	10	10	0
At ye tennis court...	...	...	...	...	...	0	9	6
A coach for Sir John Paulet from Bath	...	...	...	...	...	1	19	0
Jan. 27, 1647. Rd. for my Genl. 14 days' pay	...	...	...	...	...	140	0	0
Rd. at several tymes, by Mr. Powell, 56 days' pay	...	...	...	...	...	560	0	0
for my General	...	...	...	...	...
June 6th. Rd. for my General as Major and Lieut.								
of his regt. and troop of horse, 15 days' pay	...	...	...	...	...	101	10	0
Rd. of Mr. Rushworth which I had formerly paid								
Mr. Bedford	...	...	...	...	...	56	16	0
Oct. 14. Rd. at London, per my General, 14 days' pay	...	...	...	...	...	140	0	0
Dec. 14. Rd. at Guildhall, 28 days' pay	...	...	...	...	...	280	0	0

Simon, the great medalist, struck five medals in honour of Fairfax. They were struck for the purpose of being given as rewards to officers or soldiers who distinguished themselves. One was presented by the Parliament to John Sharp for his faithful services under Fairfax in 1645. Two were bought by the Bishop of Hereford (Lord James Beauclerk) at Thoresby's sale in 1764, and there are four in the British Museum. Lord Fairfax's medal contains his bust, with the inscription—THO. FAIRFAX. MILES. MILIT. PARL. DVX. GEN. On the reverse, the legend, "*Post Hac Meliora.*" Inscription in the field, "MERVISTI," and on the exergue, 1645.

The medal was accompanied by a parchment certificate as follows :—

I doe acknowledge that John Sharpe hath deservedly received a medall from the Parliament and City of *London*, in remembrance of his faithful service under my command in the year 1645.

FAIRFAX.

The certificate contains the seal and arms of Fairfax on a wafer.

A second certificate, signed by Fairfax, was also issued after the close of the Western Campaign, of which a *fac-simile* is given. It contains the seal and arms of Fairfax in wax. These relics are still in the possession of the representatives of Abraham Sharp's branch of the family, and have been generously entrusted to our care by Major Haines, of Westminster.

It is also interesting to note the care by which they have been handed down to the present generation. In one of Abraham Sharp's memorandum books, under date May 15, 1718, occurs the entry—

Cozen's things she gave me to keep.

1 silver box, wherein are 5 sceptres. 4 broad pieces, 5 guineas, and a medal of Lord Fairfax.

It is needless to add, that objects of such priceless value are regarded by the present representatives of the family with great veneration. It was not so with all the relics of the Fairfaxes. A vast quantity of heirlooms and relics of the earlier Fairfaxes—books, manuscripts, letters, paintings, old furniture, coins, medals, and articles of *vertu*—were removed from the Yorkshire mansions, Steeton, Denton, and Nun Appleton, to Leeds Castle, where they remained neglected and esteemed of but little value by the successors of the Fairfaxes, until 1831, when what remained were disposed of by auction at Christie's Rooms. The furniture and paintings having been sold previously, the books and manuscripts were then put under the hammer.

It would appear from the following letters written by John Sharp, from Hull, that he was engaged in military duties in the year 1649. The first is written to his wife, but is too long for insertion. The contents, too, are such as a fond husband, separated from the object of his affection, would

write, being interwoven with the fondest expressions, and also showing the depth of his religious aspirations. The letter is endorsed—"For his true friend, Mary Sharp, at her house at Horton," and begins as follows :—

HULL, *January 29, 1649.*

SWEETHEART,

Since my coming hither, meeting with some cross occurrences wh. layd upon me with vexation of spirit, having no friend to consult with or take comfort from, I took the liberty to vent my heart freely to thee in all the particulars of my case, hoping not only hereby to ease my spirit by breathing out my troubles, but to receive comfort and refreshing advice from thee, which in some respects and degrees I acknowledge to have don, for which I bless my God. . . . I cannot see, though I have writt and writt to London for liberty to come, that I can come home yet about any business of my own. The days are short, ways bad, business lyes on, and evil eyes upon me render me unfit to come yet, nor have yet any convenience for seeing my family. If I have none to help to soothe and counsel me, I have none to trouble and vex me. The inclosed from thy brother may tell thee concerning Ick. what to doe. I see no great commendations in it of the master he had provided. Perhaps he may satisfy thee better if he doe not goe to this master. I'd set him to spin or drive a plow rather than send him to live under my sister till thy brother provide him a master. Let Ick. be careful to look over his arethmatick, the 5 grounds of it, viz., numeration, and with the golden rule and rule of allocation. Let him not think of going to London unless he be pretty expert in these, but expect to be bett and knockt and made a blockhead and drudge. Quickness and expertness herein will be the first things that will bring him off this drudgery, and into credit and respect with a master. Send the inclosed to my brother Gilbert, and send him a horse to come to Bradford at his first convenience, first hearing from him when that may be. Pray thee remember my dear love to Thomas Swayne. Perhaps, thou may persuade him to let young Thomas go to fetch him, or lend a horse when he is not busy for Ick. Talor or some other to ryde on to fetch him. I leave the letter unsealed that thou may acquaint others with its contents. Remember me to the captayne. Tell him a friend he is at all tymes.

As a postscript :

Pray thee send me my Bible, the Modell of Moderne Divinity, and the Book of Rates, which has layd in the new parlour window. I want som other things, but there's soe much within I must forbear to say more.

A perusal of the Sharp pedigree affords some light upon the passages referring to the third son, Isaac. When the letter was written Isaac would be eleven years of age, having been born in 1638. He died a London tradesman in 1674, having outlived his father two years. The recommendation to put his son to learn spinning pending a master being found for him is characteristic of the plodding Yorkshireman, as John Sharp undoubtedly was, and the value he placed upon a good groundwork in arithmetic was doubtless derived from his own experience. Mrs. Sharp's brother referred to was the Rev. William Clarkson, Rector of Adel.

There was another letter written by John Sharp from Hull a few days after the previous one. Unfortunately it is without address, and the contents are also ambiguous. It is as follows:—

HULL, *February 5th, 1649.*

If ever I sitt in the porphiry chare I will grant you an indulgence for your otherwise unpardonable complement of kissing my foote. You writt and unwritt, the while I thank you for nothing. These deviding tymes may devide our affections if we be such foolish wakelings to be hayld by passion and prejudice beyond the medium of reason and judgment. I thank you for your kind invite to York. When the recruiting from Hull stands in competition with my riveted affections to you I doubt not but to have a candid construction of my carriage if I doe not see you at York at the tyme set. If Walkinton* could furnish me with a horse, which it cannot, I would not therefore conceive that I had as good friends at Walkinton as at home, nor yet the contrary. Every man is most possest with his own grievance. I'm sure mine own touches me, and where is my help? The Lord support us all is the desire of him who is though not perfectly yet sincerely

Yr affectionate cozen,

JOH. SHARP.

John Sharp died on Whit-Sunday, 1672, respected by his fellow-townsmen, and was buried at Bradford Church. The perusal of his will and other evidences show that he had acquired a very substantial estate during his lifetime.

* The Rev. John Nalson, Rector of Walkington, married Sarah, the sister of John Sharp.

Will of John Sharp, of Little Horton.

(Dated September 30th, 1670.)

I, John Sharp, of Little Horton, in the parish of Bradford, yeoman, being frail of body but sound of mind (praise be God), and being desirous to put in order my temporal estate, do publish this my last will and testament, that is to say,

I confirm to Wm. Clarkson, late of Addle, my brother-in-law, and Thos. Swayne, of Cinderhills, in Horton, all that message, &c., now in the occn of me, the said John S., and also all that message in the tenure of Joshua Wilkinson, and formerly in the occn of Robt. Wright, to the behoof of me, the said John S., during my natural life, and to my eldest son Thos. Sharp at my decease; and also of all those 2 closes called Far Langsides, in Horton, aforesaid, and now in my occn, abutting upon the lands of Wm. Midgley, of Haworth, on the west, and of a lane leading between the upper end of Bradford to a place called Scolemore on the south, and upon one brook running to Bradford called the Middle-broke on the north, and also of and upon one mansion house and barne thereto belonging, and of one close of land adjoining thereto, formerly known as the Savoyard, abutting upon the lands of John Lister on the east and west, and upon a lane leading from Bradford to Litt. Horton on the north, and part upon the lands of Isaac Baume on the south part, with all their appurtenances, &c., to my second son, John Sharp, and his heirs, except my eldest son pay to his brother John within the space of four yrs after my decease the sum of £150. Also it is my will and mind that Thos. Swaine and Wm. Clarkson shall stand possess of 2 closes of land called Lidgets, in the occupation of Hugh Sawley, of Bradford, aforesaid, adjoining upon the lands of William Swaine and Isaac Sharp, in Horton, aforesaid, on the east and south, and upon a lane leading from Little Horton to Bradford on the west, and also of and upon another close of land called Little Northcroft on the north, belonging to me, the said J. S., and in the occn of Richard Booth, of Horton, on the west part, and upon one water or brook descending from Great Horton Mill to Bradford on the north part, and upon one lane or highway leading from Bradford to Great Horton on the south part, to the use and behoof of Abraham Sharp, my fourth son, his heirs, &c., provided that Thomas Sharp, my eldest son, pay not to him the sum of £160 within the space of three years after he shall be at liberty from his apprenticeship, then my will is, &c.,

To Robert, my fifth son, I bequeath certain lands in Horton called Higher End, abutting on the lands of the heirs of Thos. Richardson and Robt. Balme, and a certain road leading from the upper part of Bowling to Little Horton (Smiddles), and also of and upon the two closes of land called the Moor Closes, abutting upon the lands of Sir John Armitage, of Kirkleys, Baronet, and Isaac Sharp, of Horton, and abutting upon Southfield Lane and upon a lane leading from Little Horton to a

place called Reevy, also of and upon another close commonly called the Hill Ings, abutting upon the lands called Hill End, Calf Close, and Old Hill, subject to the payment on his account of the sum of £200, or of such sum as might be necessary to bind him apprentice to some lawful calling, and the remaining part within the space of four years after he shall be free of his apprenticeship. . . . And my will and mind is that whereas I have heretofore preferred Isaac Sharp, my third son, more than any other of my younger sons, therefore I do hereby give and bequeath unto the said Isaac, my son, the first and whole sum of £20 to be raised out of my goods within the space of seven years next after my decease in lieu of his portion. To Martha, my daughter, in lieu of her portion, the sum of £200, to be raised out of the remaining part of my goods, to be paid her, £100 within 6 mos. of her marriage, and £100 within 12 mos. of her said marriage (to secure which sum the close of land called Narr Langside was assigned in trust), and if Martha, my daughter, do not marry within the space of six years that then one moiety of her portion be paid to her. To Martha he also gave the best bed and furniture after her brother had chosen, and also the best chist, "except the meale arc in the kitchen." His son Thomas to enjoy all rents, profits, &c., until the portions of the younger children be discharged, provision being made for the maintenance and tuition of his younger children during their minority, bequeathing to each of his hired servants £12, and appointing Mary, his wife, and Thomas, his eldest son, joint executors, and Jonas Waterhouse, of Bradford, supervisor.

(Signed)

JOHN SHARPE.

In the presence of us—

DAVID PARKINSON,
JO. SUGDEN.

Will proved Aug. 2, 1672.

CHAPTER VIII.

REV. THOMAS SHARP, M.A.

Born October 30, 1633—Educated at Bradford Grammar School—Entered Clare Hall, Cambridge—Letter from his mother—Samuel Sharp, also a student at Clare Hall—Thomas Sharp enters holy orders—Ejected for his nonconformity—Returns to Horton Hall, for which he obtained a preaching licence—Partially rebuilt Horton Hall after his father's death in 1672—Minister at Morley, and afterwards at Mill Hill Chapel, Leeds—Died August, 1693—Inventory of his goods—Extracts from his account books—Thomas Sharp's will—Will of Faith Sharp, his widow.

The Rev. Thomas Sharp, M.A., the eldest brother of Abraham Sharp, deserves more ample treatment than was accorded him in the brief reference made in the opening chapter of this work. Both in respect to his literary ability and theological attainments, he was a fitting representative of a family which, as regards antiquity, respectability, and the eminent men it has produced, stands very high.

Thomas Sharp was born on the 30th October, 1633, at Little Horton. Born of parents whom the doctrines of religion strongly permeated, he was in early life destined by them to the work of the ministry, although as eldest son he was heir to a considerable estate, and one to whom his father, John Sharp, might naturally have looked to assist him in his

business as an extensive clothier. In good time he was sent to the Bradford Grammar School, which has been previously referred to as a noted nursery of learning, and in the year 1649 was entered at Clare Hall, Cambridge, and placed under the tuition of his distinguished maternal uncle, David Clarkson, and afterwards under Tillotson, who became Archbishop of Canterbury. Under these notable tutors, Thomas Sharp became an excellent classical scholar and mathematician.

While at college, Thomas Sharp received the following, among many letters, from his mother, Mary Sharp, or as she signs herself, "Marie," which is full of interest and is marked by that religious fervour, which distinguished the family of Clarkson, from whom she sprang. It is in a beautiful style of handwriting, and is as follows:—

HORTON, 23rd October, 1656.

DEAR SON,

It is a long time since I heard from you, and many times I am troubled that we cannot hear when Mr. Sturdy goes or comes. If you would not miss of writing by him we should know better how and when to write to you. The last we had was by young Stanhope, which was writ a good while before. I hope you will not fail to write either by our cosen, if you can spare time, or by Sturdy the first opportunity. I long to hear how it pleases the Lord to carry on his own work in your soule, which to hear would be some refreshment to my drooping spirits, which grones and moanes under a senseless and unprofitable frame of heart under my frownes and corrections, which I cannot find the fruit of as I desired and hoped for. I know it is my sin that procures evill to me, and hinders good from me, but I cannot see the great evill that is in sin, nor get my heart affected with it, to lothe myself for it as I should. Oh, that I had faith to believe for that after-fruit, and a heart to indure to the utmost, that I might lose none of that good which the Lord is willing to reach out to His chastened ones. I hope you will not fail in your earnest requests to the Lord that He would please to own our pore soules, and turn to us in mercy, from whom he hath hid his face for a long time, not coming in with those quickenings and refreshings in the enjoyment of His publick ordinances as in times past. Oh, for a heart to cry mightily to Him in private and in secret, as formerly. Oh, what a sad condition hath our sinful divisions brought us into. What can we expect but that some sad judgment is at hand, which is the fear of many. The good Lord fit us for a suffering condition, and help both you and me and all our near relations to make

our peace with God, that, what times soever come, we may be found in Christ.

Your father and I will expect you and your brother John next summer, if God grant health and peace. The last letter I had from John he seemed to be under some conviction. I should bless the Lord to hear that it might be carried on to a thorough conversion. I wish when you have opportunity you would put him in mind of that great work of regeneration that we must all pass through before we can enter into life.

If I had known in time that Cosen Wilkinson would have seen you, I would have sent you a pair of gray stockings, but will send them when they are ready. I desire to know what became of brother Sam's linen; it would trouble me to lose it. I mean his sheets, and shirts, and napkins, for I had provided well for him. If God had given him life he would have wanted no more for a long time, but we were unworthy of such a mercy, and God hath hid him from an evil which I fear is to come. God help us all that are left behind to stand in the gap and to cry mightily for redeeming grace. The good Lord pour out much of his spirit upon you, and make you an able minister of the New Testament, is the earnest prayer of

Your dear mother,

MARIE SHARP.

The brother "Sam" alluded to was the third son of John Sharp, father of Thomas, and was born in 1640. He also was entered at Clare Hall, Cambridge, but died in the early part of 1656, while in the sixteenth year of his age. From the tone of the letter already given, it would appear that he, too, was a young man of promise. The following letter was written to him while at College, and is full of parental love and deep piety. It is dated

HORTON, *March 14, 1655.*

DEAR SON SAM,

It is som troble to me thatt I cannott gett so much time to write as I could wish; your father expected with his to have had one from you, which I hope you will nott neglect this time, by no meanse you may not, lest he should have cause to thinke you slight his kindnes. Bee sure to write to him as often as you can, for he was one great incouragement, & put your father on to send you where you are. It seems by your letters you are where you would be, soe blessed be God thatt gives you so good health of bodie. I beseech the Lord (hee) would make you sensible of your spirituall desires &

soule wants, your miserie by nature, & your great inabilitie to extricate your self out of thatt condition thatt you & all the sons of Adam are in, till itt please the Lord to open your eies & turn you from darkness to light, from the power of Satan to God. I intreat you sett som time apart to studie & seriouslye to consider of this, for whatt is learning without grace to improve itt aright, itt will butt agravate your condemnation. Therefore cry unto God thatt he would make you a new creature, & lett you see your necesite of a saviour, to deliver you from sin here, and from wrath thatt is to com hereafter, to all that is out of Christ. It is no small comfort to your father & me thatt itt hath pleased our good God to awaken your brother Thom: & to lett him see whatt he is of himselfe. The Lord awaken him more, & though itt hath been sad with him, yett our hopes are thatt our God will perfect his own worke & make him a comfort to us all. The good Lord make you & all the rest so too. Company with him as much as you can while he staves in the Colledg, for I perceive he hath an inclination to leave C for a time, the Lord direct him, & be with him, & keepe you allsoe from sin and vanitie, is the earnest request of your carefull mother

MARIE SHARP.

Continuing the career of Thomas Sharp, it would appear that after entering into holy orders, in 1660 he accepted a curacy at Peterborough, but removed to Yorkshire shortly afterwards. His uncle, the Rev. William Clarkson, Rector of Adel, near Leeds, dying, Henry Arthington, Esq., presented him to that parsonage; but Dr. Hick, the parson of Guiseley, challenged his title to the incumbency on the ground of having been ejected for nonconformity. He then retired to his father's house at Little Horton. After a time he removed to Reading, but in what capacity he resided there does not appear. In the year 1668 he married Elizabeth, daughter of Mr. Bagnall, who gave birth to a daughter, and both died soon afterwards. When licences to hold religious services were granted by Charles II., in 1672, he availed himself of the opportunity to return to his own house at Horton, which he had that year inherited (with a considerable estate) on the death of his father, and there exercised his ministry, "the house being crowded with great numbers that flocked to hear him." During the year 1673 he married Faith, the daughter of the Rev. James Sale, an eminent Nonconformist minister at

Pudsey, and a man of great reputation among his party. By his second wife, Thomas Sharp had several children, but only two survived him. On taking up his residence at Little Horton, he began in 1676 to rebuild a great portion of his father's house upon a plan drawn by himself, which is now in the possession of Mr. F. S. Powell, of Horton Old Hall. After ministering for some years at Little Horton, he received a "call" to Morley, where he continued a considerable time, and then, receiving an invitation to become the minister at Mill Hill Chapel, Leeds, he accepted it and fitted up a house in that town, but still kept up his house at Little Horton and rode to and fro between the two places. He had ridden from Horton to Leeds on the 4th August, 1693, and preached. Soon after he was attacked by his old enemy, the pleurisy, which terminated his life on the 27th of the same month, in the sixtieth year of his age. He was buried at Leeds.

Thomas Sharp is mentioned as a fluent and orthodox preacher, of pious life. He was very studious, and having excellent natural abilities and great advantages of education, he became a universal scholar. He wrote, among other compositions, a work entitled "Divine Comforts, Antidoting Inward Perplexities," which obtained an extended circulation; also "Verses on Sleep," and other pieces of poetry.

Calamy said of the Rev. Thomas Sharp—"He was every way a great man, and yet cloathed with humility. He was very laborious in his work, full of self-denial, exceeding temperate and mortified to all earthly enjoyments, and of a peaceable, catholic spirit. He was excellent in prayer, and a fluent preacher. His sermons were elaborate and accurate; and all his performances were exceeding polite and scholar-like."

From an inventory of the goods and chattels of Thomas Sharp now before us, it appears that their value in his house at Horton amounted to £149 18s., and at his house at Leeds to £134 17s. 4d. Many of the items are interesting, but the

full inventory is too long to publish entire. From it we cull a few items, viz. :—

At Horton Hall.

	£	s.	d.
His purse and apparel	15	0	0
<i>In the Hall—</i>			
1 large table... ..	2	0	0
1 square table, one long settle, and one watch chair...	1	3	0
<i>In the Dining Room—</i>			
1 round table and carpet	2	10	0
1 square table and 1 seeing glass	2	0	0
12 chairs with backs, 2 seats set work	4	10	0
6 arch chairs, covered with set work	1	10	0
4 pictures, large map, and weather glass	6	0	0
<i>In the Little Parlour—</i>			
1 stand bed, 1 half-headed bed... ..	2	0	0
<i>In the Great Parlour—</i>			
1 bed with hangings	3	10	0
1 clothes press and 7 chairs	1	13	4
<i>In the Best Chamber—</i>			
12 arch chairs and 1 table	2	11	0
1 pair bedstocks, one feather bed, and bedding—with hangings	5	0	0
6 chairs covd. with set work, and couch chair	4	10	0
1 buffet and stool, 1 screen	0	13	4
<i>In the Study—</i>			
4 maps that hangs up, a colln. of other maps, and the library	80	0	0

As already stated, John, the father of Thomas Sharp, M.A., died on Whit-Sunday, 1672, and in the possession of a considerable estate. The following extracts from the Rev. Thomas Sharp's notebook, in the possession of Mr. Hailstone, gives a tolerably clear impression of the value of that estate, and of how it was administered by his eldest son :—

MY FATHER'S ESTATE.

Land himself never esteemed above	£80	0	0
Goods in inventory	190	15	0
The total of all he dyed possesst	£1790	15	0

CHARGE UPON IT.

Funeral Expenses £16 5 0

Debts—To my Lady Maynard 114 5 0
 To Ester Clarkson... .. 50 0 0
 To Robert Clarkson 24 15 0
 Wormall's debt in ye book, and for goods 11 4 0
 Isaac's funeral expenses 15 0 0
 To Capn. Dixon for poles, and Rawnsley for stones... .. 0 18 0

£216 2 4

Legacies and Portions—

To Bro. John 150 0 0
 To Sister Martha 200 0 0
 To Bro. Abraham 160 0 0
 To Bro. Robert 140 0 0
 To Mr. Waterhouse 0 10 0
 To hired servants 0 5 0

£650 15 0

Debt to Mr. Waterhouse for tythe wh. my mother
 will satisfy 5 0 0

Leaves £888 3 2

Out of which must be deductd. for Lady Maynard... .. 60 0 0

Leaves £828 3 2

Before my father's death I pd.—

To Bro. Isaac, Aug. 10, 1670 100 0 0
 And upon his request to increase his stock 40 0 0
 A debt at my father's reqt. 75 0 0
 Brother William 20 0 0
 Bro. Abraham (indenture) 20 0 0
 Bro. Robert... .. 60 0 0

£315 0 0

*Charges which I have been at about my brothers, and in
 fulfilling of my father's will, reckoning till this,
 Sep., 1675—*

Paid my Bro. Isaac's portion 140 0 0
 Paid Wm. apprenticeship money 70 0 0
 Paid Abraham's apprenticeship 20 0 0
 Paid Robert's apprenticeship 60 0 0
 John's portion 150 0 0
 Martha's portion 200 0 0
 My Lady Maynard 50 0 0
 Isaac's funeral expenses—to John 15 0 0

To Capn. Dixon, 13s. ; Rawnsley, 5s.	£0 18 0
Debt in ye book to Wormall's	10 0 0
Pd. of ye funeral expenses for father	3 0 0
Paid ringers 2s. 6d., Clerk & Vicar 3s. 4d., for Mortuary 10s., Sermon 10s.	1 5 10
Debt of my father, which my mother knows... ..	75 0 0
Debt to Wormall's for goods, £11 15s.—my father's part came to £5 4s., whereof £4 was his legacy	1 4 0

£756 7 10

Remaining still to be paid—

Abraham's portion	160 0 0
Robert's portion	140 0 0
To Coz. Robt. Clarkson	24 15 0

£324 15 0

Will of the Rev. Thomas Sharp, M.A.

In the name of God, Amen. I, Thomas Sharp, of Little Horton, in the County of York, clerk, being weake in body but of good understanding and perfect memory, doe make this my last Will and Testament in manner and form following. First, I freely resigne up my soule into the hands of my glorious Creator, firmly hoping for salvation through the merits of my blessed Redeemer, the Lord Jesus Christ, and my body to be buryed at the discretion of my executors hereafter named. And as to my temporal estate,

Imprimis, I give and bequeath unto my daughter, Martha Sharp, and her heirs for ever, All that my messuage, house, lands, and farms in the occupation of John Boyse, of Bradford, as also all that farm in the occupation of Thomas Mountain, formerly in the occupation of Samuel Lister, with all their appurtenances whatsoever thereunto belonging.

Item, I give and bequeath unto my daughter, Elizabeth Sharp, and her heirs for ever, All that my houses, lands, and farms called Breckon Hill, in Great Horton, now in the occupation of John Dixon, with all their appurtenances, as also a piece of ground called Moor Closes, fifteen days' work more or less, as also my Close adjoining to the New Meeting Place, called Higher End, being five days' work more or less, both in Little Horton, with all their appurtenances, also my two Paddocks, in the occupation of Jeremiah Rhodes, as also my parcel of ground called the Gooselands, in the occupation of the said Jeremiah Rhodes, with all its appurtenances.

Item, I give and bequeath unto my sonne, John Sharp, and to his heirs for ever, All those my houses, lands, and pastures at Holme Top, at Little Horton, in the occupation of the said Jeremiah Rhodes, with all their appurtenances; also my house and land at Bradford Town End, now in the occupation of John Murgatroide; also my lands called

Langsides, in Horton, in the occupation of Samuel Stansfield, with all their appurtenances. And it is my will and mind that my sonne John shall enter into the above when he shall attain unto lawful age.

Item, I give and bequeath unto my beloved wife, Faith Sharp, my houses, land, and farm at Beeston, in the occupation of John Atkinson, with all their appurtenances ; also my housing at Leeds Towne End, in my own occupation, now being with all its appurtenances to be sold for the discharge and payment of my lawful debts.

Item, I give and bequeath unto my said dear and entirely beloved wife all my personal estate whatsoever, and it is my will and mind that the houses and lands bequeathed to my two daughters be at the sole management of my dear wife for their education.

Finally, I doe hereby constitute, ordain, and appoint my said dearly beloved wife, Faith Sharp, sole executrix of this my last Will and Testament, and I doe hereby revoke and disannull all former wills and testaments. In witness whereof I have hereunto sett my hand and seale, this twenty-sixth day of August, A.D. one thousand, six hundred, ninety-three.

THOMAS SHARP.

Sealed, signed, published, and declared this to be my last Will and Testament, the day and year above mentioned, in the presence of Elizabeth Wilson, Bryan Dixon, Ralph Thoresby, Dorothy Ingham.

Will proved Jan., 1694.

Faith Sharp, the relict of the Rev. Thomas Sharp, survived her husband for some years, during which she resided at Horton Hall with Abraham Sharp, her brother-in-law. She died in June, 1710, aged fifty-nine, the following being a copy of her will :—

Will of Faith Sharp.

In the name of God, &c. I, Faith Sharp, of Horton, &c., bequeath all that tenement, &c., in Farsley, in the possession of Richard Goodall, a messuage at Wheatley, to Mr. Abraham Sharp, my late husband's brother, and after his decease to Elizabeth Stansfield, my daur., until such times as Faith Stansfield, my grandchild, shall attain the age of 21 years. Also messuages at Stead and Burley-Woodhead in Wharfedale, and Horsforth. And my will is that Elizabeth Stansfield, my dau., and Faith Stansfield, my grandchild, and their heirs shall, out of the profits thereof, pay yearly, so long tyme as the Chappel or meeting-place at Horton shall be tolerated by law, and supported and kept up for a place of worship in any part of that township, unto the preaching minister there

for the time being, the yearly sum of forty shillings, in testimony of my desire for its continuance. And I doe further will and charge my said daughter, Elizabeth Stansfield, and her heirs to pay out of the profits of the said premises to distribute and pay yearly during such tymes as the capital messuage at Horton, wherein I now dwell, shall be uninhabited by the owners thereof, the yearly sum of forty shillings amongst the poor of the town of Horton, yearly, in the winter season, according to the discretion of my brother, Abraham Sharp, during his lifetime, and after his decease according to their own discretion. &c., &c.

FAITH SHARP.

Witnesses—

ISAAC SHARP,
MARTHA LISTER,
JOHN MIDGLEY.

Pedigree of Francis Sharp Powell, Esq., M.P., of Horton Old Hall.

[DRAWN BY COURTHORPE, PURSUIVANT OF THE COLLEGE OF ARMS.]



ARMS OF POWELL: Arms quarterly of Six. *First and Sixth*.—Sable, three escalloons argent, each charged with a boar's head erased of the field, langued gules, all within a bordure or.—*For POWELL*.—*Second*.—Per pale indented azure and gules, a chevron between three doves argent.—*For WADE*.—*Third*.—Or, a cross voided sable, in the centre point a leopard's face *passant de lis* of the last.—*For BRIDGES*.—*Fourth*.—Ermine, a lion rampant sable, upon a canton of the last three mullets or.—*For STAPLETON*.—*Fifth*.—Azure, a pheon argent, on a bordure of the last charged with eight torteaux and cross crosslets gules alternately.—*For SHARP*.

CREST: On a wreath of the colours a lion rampant sable langued and armed, gorged with a double chain or, therefrom pendant a pheon argent, the sinister forepaw resting upon an esccheon also cr, charged with an eagle's head erased azure.

MOTTO: *Omne Bonum Dei Donum.*

CHRISTOPHER SHARP, of Horton, born some time before 1480, died in 1543, possessed of considerable property. Had a brother (or near relative) James, witness to his will in 1541, presumed to be the father of James Sharp, of Woodhouse, N. Bierley, grandfather of Archbishop Sharp. Left an only son=

JOHN SHARP, = ISABEL,

his executor, who on his father's death was assessed in £20 in goods, and from whom sprang the Sharps of Tong. Like his father, was buried at the Church of St. Peter, Bradford. Will dated 9th February, 1557; proved April 27th, 1558.

THOMAS SHARP, = ELIZABETH,

called the elder, yeoman and clothier, of Little Horton, to whom his father, in 1557, left "one thing of the best of every kind of vessel accustomed to be occupied at his house at Horton." Purchased of the Laies in 1589, with three others, 250 acres of the moors and wastes of Horton. Buried at Bradford Church. Will dated 23rd April, 1607; proved 16th July following. Settled on his younger son, John, a portion of his estates.

JOHN SHARP, of Tong, Will proved 1613.

CHRISTOPHER SHARP, of Little Horton. Will proved May, 1608.

THOMAS SHARP, junior, = MARGARET.

son and heir, of Little Horton, yeoman, witness in 1607 to the will of his uncle, Christopher. Released to his brother John his interest in a portion of his estate. Buried at Bradford Church. Will dated 16th August, 1636; proved 5th April, 1637.

ISAAC.

JOHN SHARP, = SUSAN,

yeoman, of Little Horton, a distinguished Royalist, who never suffered his beard to be shaven after the execution of Charles I. Married in 1606. By various indentures his father settled on him a portion of his estates, to which he added by purchase from his elder brother Thomas. Buried at Bradford, 2nd June, 1658. Administration granted to his daughter October, 1662.

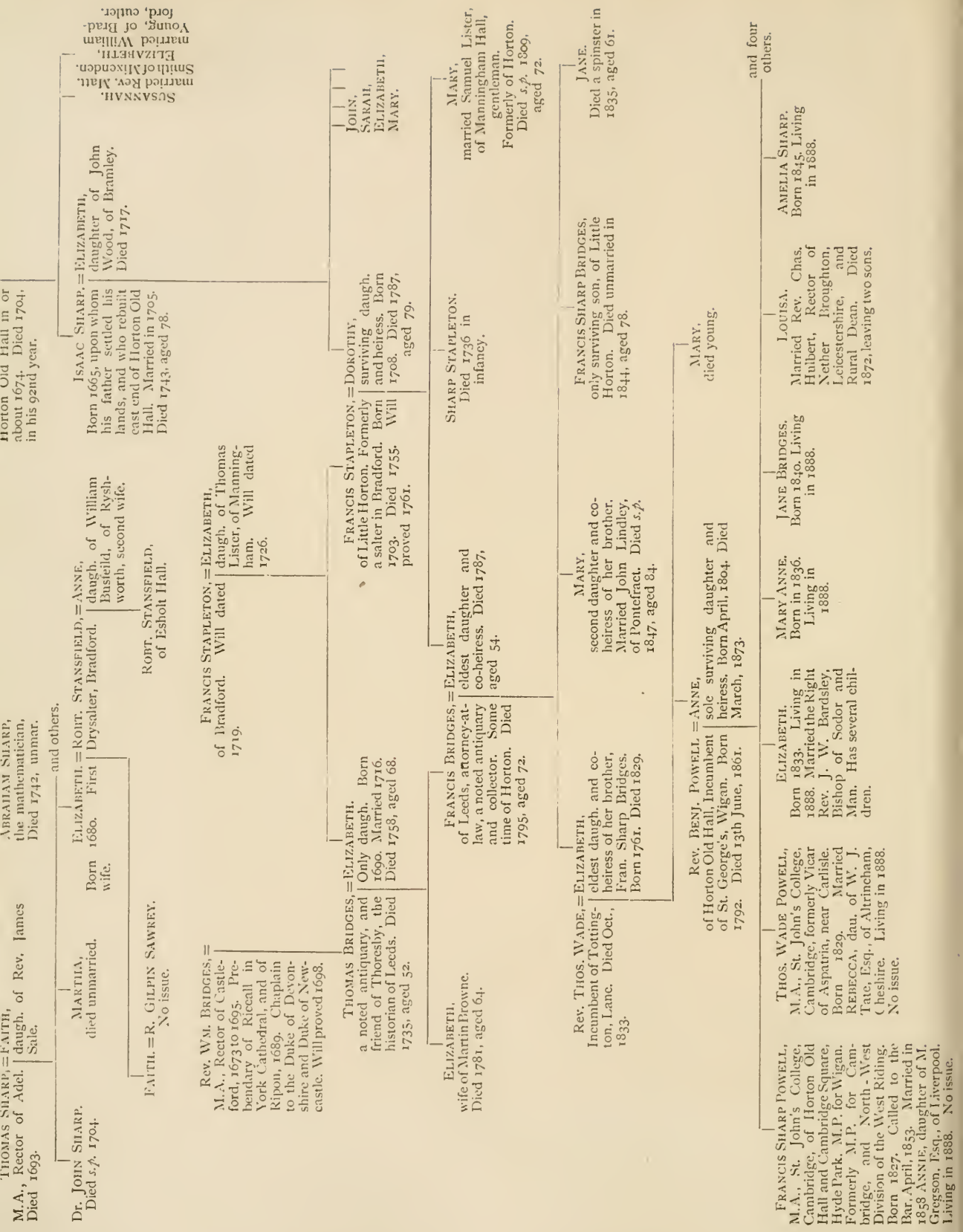
MARY,

only daughter. Married to Michael Waterhouse, of Shelf, Skircoat, gentleman.

JOHN SHARP, = MARY CLARKSON, the noted Parliamentarian, and daughter of Robert Fairgrip, Bradford. Married in 1667. Secretary of Genl. Fairfax. Born 1667.

ISAAC SHARP, = ELIZABETH, Born 1613. Lieutenant of Joshua Rhodes, of Mirrington, in the Train Bands of a Company of Foot, by field.

THOMAS SHARP, of South Kirkby. Conveyed his estates in Horton to his



CHAPTER IX.

FAMILY OF JOHN SHARP, THE ROYALIST.

John Sharp, the Royalist—His possessions—A distinguished partisan of Charles I.—His relics at Horton Old Hall—Lieutenant Isaac Sharp, his son and heir—Held commissions in 1663, 1673, and 1688—Added considerably to the paternal estate—Rebuilt Horton Old Hall—His death at ninety-years of age—Isaac Sharp, his son—Recital of his will—Indenture showing his possessions—The Stapletons and Bridges—Thomas Bridges, a noted antiquary, and friend of Thoresby—Francis Bridges, his son, great collector of coins—Francis Sharp Bridges—Rev. Benjamin Powell—Francis Sharp Powell, M.P.—Description of Horton Old Hall—Its valuable collection of books and MSS.

Previous reference has been made to the fact that the family of Sharp, of Horton, was in two branches, the partition taking place upwards of two hundred years ago. The two branches were of different religious and political tendencies—the elder branch, that to which Abraham Sharp belonged, being staunch Parliamentarians and Puritans, while the younger branch were Royalists and Episcopalians.

As will be more clearly shown by a glance at the pedigree, the family had a common origin, but became divided after the death of Thomas Sharp, styled the elder, whose will was dated 1607, and whose eldest son was Thomas Sharp, the

younger, father of John Sharp, the Parliamentarian, whose line we have already traced.

Brother to Thomas Sharp, the younger, and therefore uncle to John, the Parliamentarian, was John, generally styled the Royalist, from his attachment to the cause of King Charles. On 18th May, 1601, he was joint purchaser with his father, as has been stated, of the South Croft, the North Croft, the Acres, Leysteads, &c., and divers rent charges, all of which were conveyed to him.

In 1606, John Sharp contemplated marriage with Susan, a daughter of Richard Waterhouse, of Shelf. In consideration of that marriage, Thomas Sharp released to his son, by indenture dated June 15, 1606, "all the messuage, lands, &c., purchased by him of Thomas Wood, of Askwith, and of John Wood, his son and heir. Also all that close called the Intack, or Bowling Mill Close, late in the tenure of William Law, and purchased by Thomas Sharp of Thomas Hodgson, late of Bolling, deceased; also the Hollingreave lands, and the third part of a close called the Haycliffe, and in a place called Nethermore; and also the third part of a close of land lately enclosed from the common of Horton on the north and east side of a hill called Haycliffe, and in a place called Over Moor." On his part Richard Waterhouse, the father of the intended bride, agreed to assign to John Sharp, his intended son-in-law, "all that messuage in Shelf wherein he dwelt," also the sum of £150 and other property upon the consummation of the marriage.

On April 13th, 1607, John had from his father a conveyance of a moiety of his moiety of the unenclosed wastes of Horton, which had been purchased from the Lacies in 1589. On 5th June, 1609, he had a release from his brother Thomas of his right in the Lower Moor, &c. In February, 1615, he purchased from Elizabeth Baystow, widow, two closes called Barnet Greaves and Storbrokes, which, by

indenture 6th May, 1658, he settled upon his younger son, Thomas Sharp, of South Kirkby.

At the assessment of subsidies made in 1621, 1624, 1627, and 1640, his lands were uniformly valued at 20s. per annum. By indenture, 4th March, 1629, he purchased Kent Close, in Little Horton, from Henry Walker, of Bradford, and a grant from his nephew, John Sharp, the younger, on 15th August, 1639, of the tithe of corn on certain lands in Horton which he occupied, and which by indenture 29th March, 1658, he settled on Isaac, his son and heir apparent, as well as messuages, &c., purchased of Thomas Wood; and also by another indenture the same date, four closes called the Hollingreave lands, Intack, Kent Close, and Moor Close. John Sharp thus became, by release from his father and eldest brother, endowed with a considerable portion of the family possessions, and also added to them by purchase. The family records, still in existence, show how many of these acquired lands have remained in his line up to the present time.

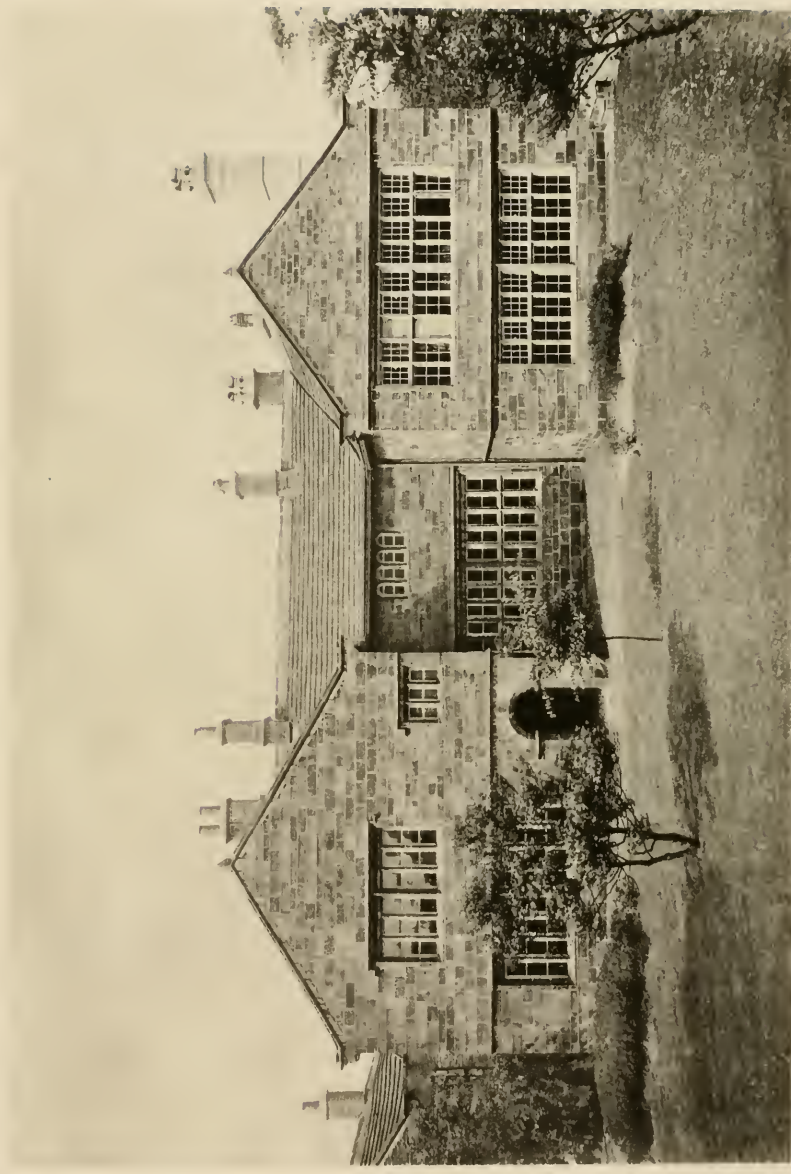
John Sharp was as ardent a Royalist and as distinguished on the King's side as his nephew became on that espoused by Parliament. He was in several battles on the side of Charles I., during one of which he received a severe blow on the head with a battle-axe. Notwithstanding, he lived to over seventy years of age, although he was wont to say that but for the awkward blow in question he might have lived to be an "old man." So distressed was John the Royalist at the fate of his Royal master, that it is said he never suffered his beard to be shaven or his hair to be cut after the execution of Charles I. at Whitehall. The headpiece worn by him in the Civil Wars is preserved among the family heirlooms at Horton Old Hall, along with armour, swords, &c.; also the helmet and armour worn by Isaac Sharp, his son, a lieutenant in the Train Bands; and other relics of the Civil Wars.

John, the Royalist, died in 1658, leaving two sons, Isaac and Thomas, the latter of South Kirkby, in the East Riding of Yorkshire. He was buried at Bradford, 2nd June, 1658, as John Sharp, of Horton, senior. Administration of his estate was granted 2nd October, 1662, to Mary Popeley, widow, his daughter.

Isaac Sharp, the eldest son, born in 1613, lived at Horton Old Hall into the next century. He was also an active partisan on the King's side, and in May, 1663, received a commission, signed by Buckingham, appointing him lieutenant of a company of Train Bands of 120 men, to be raised in the wapentake of Agbrigg and Morley, to be under the command of Captain Thomas Lister, in Sir George Savile's regiment. This commission was renewed in 1673, and again in 1688. These important documents are in the possession of Mr. F. S. Powell.

Lieutenant Sharp also added materially to the family estates. By indenture, dated March 29, 1658, his father granted him the tythe of corn in lands in Horton, purchased from John Sharp, the younger, and by indentures of the same date also messuages in Horton, purchased of John Wood. By indenture, dated 4th September, 1695, he conveyed the closes called the Intacks, or Bowling Mill Close, and Hollingreave lands to his only son, Isaac; and by indenture, dated June 1, 1704, he settled on him his messuages, lands, &c., at Horton, charged with annuities to his two daughters, Susannah Smith and Elizabeth Young. Lieutenant Sharp married Elizabeth the daughter of Joshua Rhodes, of Mirfield. One of his daughters married the Rev. Matthew Smith, of Mixenden, and another William Young, of Bradford, cutler. He rebuilt the Old Hall at Horton about the year 1674-5, as appears by initial stones upon both the exterior and interior of the mansion. Lieutenant Sharp lived to the ripe old age of ninety-two, having survived all the troubles of the Civil Wars, and the reigns of the second Charles, of James the

COL
ORV
LIB



HORTON OLD HALL.
(*South Front.*)

Second, of William and Mary ; and he witnessed the accession of Queen Anne. He was buried at Bradford, on February 16, 1704, as "Mr. Isaac Sharp, of Little Horton," although he was generally described by the Rev. Oliver Heywood and his contemporaries as "Lieutenant Sharp."

His son and heir was also called Isaac. He was baptised on the 10th of January, 1665-6. In addition to the acquisition of his father's estate, he purchased from his brother-in-law, Wm. Young, a cutler in Bradford, certain closes in Little Horton, and messuages in Little Horton from Christopher Swayne. Isaac Sharp married in 1705 Elizabeth, a daughter of John Wood, of Bramley, and had a daughter, Dorothy, married to Francis Stapleton, of Little Horton. Isaac Sharp rebuilt the east end of the Old Hall at Horton. He was buried at Bradford on the 29th July, 1743. His will was dated June 26, 1742, but it was not proved until September 7, 1761.

A recital of Isaac Sharp's will shows that he devised all his lands to Richard Gilpin Sawrey, of Horton, gentleman, and John Smith, clerk, of Mixenden, in trust for the benefit of his daughter, Dorothy Stapleton, then to her daughter, Elizabeth, and to her heirs, and in default, to his granddaughter, Mary Stapleton. His estate was charged with payment of 20s. annually to the preachers at Mixenden and Horton chapels, "so long as Dissenting ministers shall be there." He also gave all his goods ("except the wood lying in the barn, and the stones prepared for rebuilding the dwelling-house in which he lived, to such devisee of his real estate as shall rebuild the same"), to his daughter Dorothy, whom he constituted his executrix. The witnesses were John Rhodes, clothier ; James Hall, yeoman ; and John Northrop, schoolmaster. Attested by Richard Wainman, gentleman, and John Siddall, his clerk.

The following memorandum, found among the Sharp evidences, is interesting principally from its detailed reference

to the lands in the possession of Isaac Sharp at the time of his death, many of which are still the property of his descendants :—

The Estate of Isaac Sharp, deceased, late of Little Horton, in trust to John Smith, formerly of Mixenden, now of Bradford, clerk, and Samuel Lister, of Horton.

Whereas by his will, dated June 26, 1742, Isaac Sharp devised all that messuage in Horton wherein he dwelt to the use of Dorothy, wife of Francis Stapleton, his only daughter and heir, &c., his granddaughters being Elizabeth Bridges, then Stapleton, and Mary Lister, then Mary Stapleton.

This Indenture, dated June, 1762, to settle various disputes as to the disposition of the estate of Isaac Sharp, names the following lands :—

All that Messuage heretofore occupied by Isaac Sharp, in Horton, now by Francis Stapleton, and Dorothy, his wife.

All those Closes commonly known as the Laith Croft, Low Croft, Stony Croft, Far Leysteads, Far Barnet Greaves.

Also the cottage occupied by Jacob Hudson, and the Close called the Ackers ; and the Cow Close, the Hole, and Little South Croft, in his occupation ; and also the Intack—otherwise Bolling Mill Close—late in the occupation of Isaac Wilkinson ; and also the three Moor Closes, in the occupation of Ezra Thornton.

And also the Messuage and Laith, Dyehouse, and Workshop, with the Tenter Croft, the Nar Barnet Greaves, the Nar Leysteads, Great South Croft, and Long Croft, in the occupation of Wm. Duckworth, decd., at the yearly rental of £24.

And also the Stony Close and Delf Close, late in the occupation of Wm. Kitching.

And also the Great Storbroke and Little Storbroke, now or late in the occupation of William Swaine and Robt. Swaine.

And also the Close called Hollingreave Lands, in the occupation of John Rhodes.

And also the parcel of land called the Calf Hole, near Bolling Mill, in the occupation of Thos. Pulleyn.

Also the two closes called Nine Lands, and one long parcel of land leading thereto, and lying near a place called the Silbriggs, in the township of Bradford, heretofore the estate of Wm. Young, and late of Rich. Gott, decd.

Also the several rent charges arising out of the Hollingreave Lands, the Intack, Spittle Roods, Far Langsides, Broad-dole, Hutcheon Yards, the Bent, all of which are in Horton, and the inheritance of Isaac Sharp.

And all that tenement in Bradford wherein John Smith do dwell, and one close of land situate in Bradford, called Piper Grave Close, in the occupation of John Smith.

And also all that house or building, situate in Bradford called the Dyehouse and Press-house, late in the occupation of John Leach, and now of John Wood.

Also those two Closes of land situate in Bradford, and called the Great Hall Field and Little Hall Field, now in the occupation of Joshua North.

And also that Messuage situate in Manningham, and the several Closes of Land belonging, commonly called the Intack, the Five Days' Work, the Marl Field, the Well Butts, the Dean Bank, the Bark Croft, the Delf Close, and the Priest Croft, formerly in the occupation of John Kitching, and now of Mary Kitching.

Also the other Closes of land situate in Manningham, in the occupation of Mary Kitching, known as the Whetley Closes.

Also that Close of land in Manningham called the Toad Hole, in the occupation of John Robinson.

Also those five Closes of land in Manningham commonly called the two South Fields and the three Brecks, now in the occupation of Mary Kitching.

And also those four Closes situate in Manningham, called New Englands, in the occupation of Alex. Prince.

Also all that Close of land in Manningham, called the Stoop Close, in the occupation of James Appleyard.

Also the Closes of land situate in Manningham, commonly called Halliwell Ash, also in the occupation of James Appleyard.

Isaac Sharp was the last of the male line of his branch of the family, and it is somewhat singular that the male line in the elder branch had ceased to exist within twelve months of his death, namely, in 1742, by the decease of Abraham Sharp, the mathematician.

In the recital of the terms of the will of the last Isaac Sharp there occurred two names brought newly upon the scene, the owners whereof were destined to play an important part in the family history which we are attempting to pourtray. The names in question were those of Stapleton and Bridges, the respective representatives being Francis Stapleton, of Little Horton, born 1703; and the Rev. William Bridges, rector of Castleford 1673 to 1695.

The Stapletons were living at Felliskirk, Yorkshire, in 1599, and one Francis gravitated towards Bradford as a drysalter, and married a daughter of Thomas Lister, of Manningham, a major under General Fairfax. Of this marriage there was a son Francis, born in 1703, who married Dorothy, the surviving heiress of Isaac Sharp, above referred to. Meanwhile Thomas Bridges, of Leeds, son of the Rev. William Bridges, married a daughter of the first Francis Stapleton, and their son, Francis Bridges, of Leeds and Horton, married the eldest daughter and co-heiress of the second Francis Stapleton and Dorothy Sharp. In this manner were the family interests of the Sharps, the Stapletons, and the Bridges bound together.

Thomas Bridges, who died in 1735, and who married Elizabeth Stapleton, was a noted antiquary and the intimate friend of Thoresby, the author of the "*Ducatus Leodensis*." Dr. Whitaker's estimate of him may be gathered from the following extract from the second edition of the "*Ducatus*," edited by the doctor, who, in his comment upon the inscription found in St. John's Cemetery, Leeds, says:—"It contains a memorial of a true antiquary, to whose activity and exactness in recording the transactions of this town (Leeds) and parish for a series of years the editor of '*Thoresby*' has been greatly indebted." Thomas Bridges also gathered the most valuable collection of ancient medals which the town of Leeds had to boast since that of Thoresby. His son, Mr. Francis Bridges, was also of an antiquarian and literary turn, and was a great collector of coins, besides having got together a valuable library, containing examples of the earliest printed books, and many MS. volumes.

This collection of coins and books, it may be added, is in the possession of Mr. Powell, at Horton Old Hall. The cabinet in which the medals and coins are contained is in itself a treasure, the lock being surmounted by a bronze shield, said to have formed the lid of a snuff-box in the

possession of Charles I. at the time of his execution. There is also a crescent-shaped bronze surmounting the shield, containing an antique design. Mr. Francis Bridges died in 1795.

His only surviving son, Mr. Francis Sharp Bridges, succeeded not only to his father's Leeds estates, but also to those at Horton belonging to the Sharp family. and resided at Horton Old Hall during a long life. He was a bachelor, and lived in a very retired way, keeping neither a large household, nor horses or equipage. His tall, erect, portly figure is still remembered in the locality. He died in 1844, aged seventy-eight years.

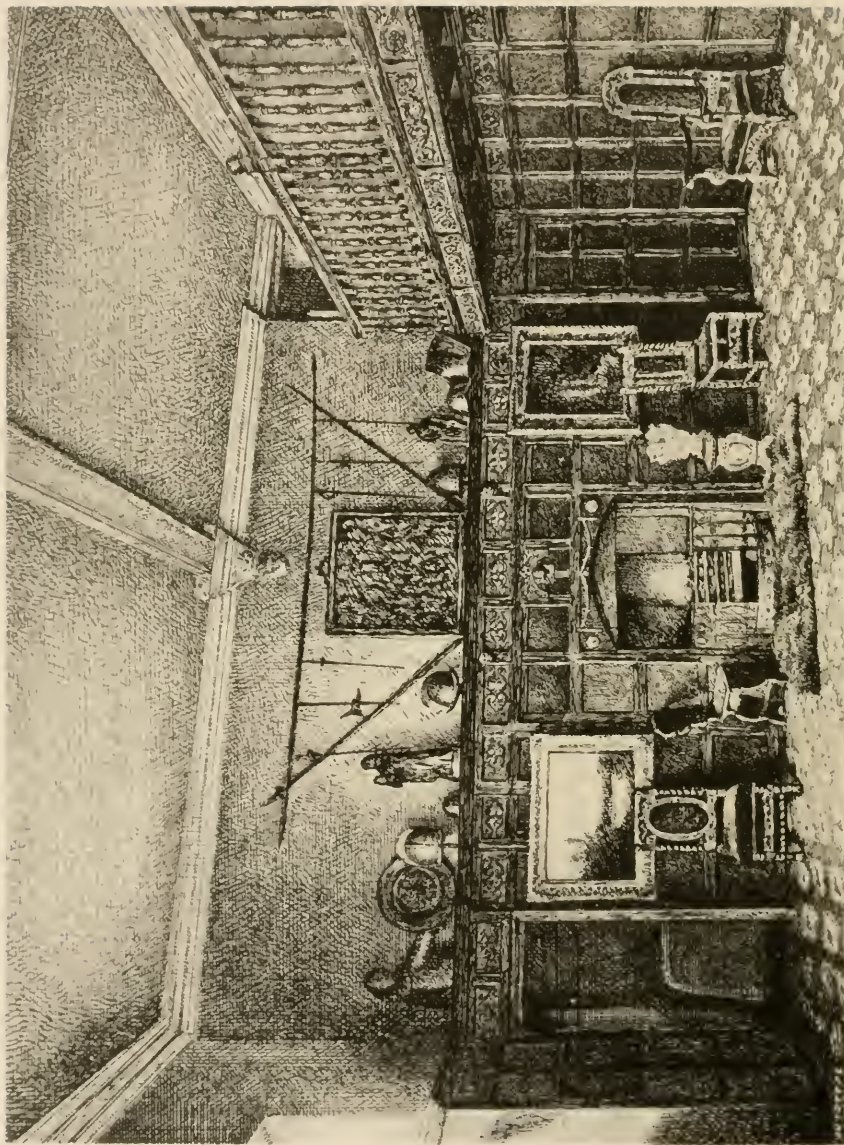
The eldest child of Francis Bridges and his wife (there being also several others, including Francis Sharp Bridges), was married to the Rev. Thomas Wade, of Bierley, near Bradford, and afterwards of Tottington, near Bury, Lancashire ; and their sole surviving daughter and heiress, Anne, became the wife of the Rev. Benjamin Powell, of Bellingham Lodge, Wigan, and incumbent of St. George's, Wigan. The Rev. B. Powell died in 1861, aged sixty-nine, and his wife in 1873 at the same age. They had a family of eleven children, of whom there survive Mr. Francis Sharp Powell, M.P., the Rev. Thomas Wade Powell, of St. John's College, Cambridge, and four daughters.

Mr. F. S. Powell succeeded to the Horton estates under the will of Mr. Francis Sharp Bridges, in addition to large properties in Lancashire derived from his father. Mr. Powell was born in 1827. He received his early education at Wigan Grammar School, and at Sedbergh Grammar School, an institution in which he has ever since maintained a lively interest. To such an extent has this interest been recognised that for some time he has been at the head of the board of governors. From Sedbergh Mr. Powell entered St. John's College, Cambridge ; was elected a fellow in 1851 ; and graduated M.A. in 1853. In the same year he was

called to the bar of the Inner Temple, and went the Northern Circuit two or three years, but his inclination was towards a political career. He has sat six times in Parliament in the Conservative interest, namely, for his native borough of Wigan, for Cambridge, and for the Northern Division of the West Riding.

Mr. Powell, however, is not exclusively a politician. His interest in movements of a philanthropic character, in educational advancement, or in social and sanitary reform has been of a practical nature. As a devoted Churchman, he has given largely of his wealth to church extension and endowment in Bradford and the neighbourhood. He has expended upwards of £30,000 upon the erection of All Saints' Church, Horton Green, the schools, and the vicarage. As an example of ecclesiastical architecture of its period this church stands pre-eminently above any other in Bradford or immediate neighbourhood. He has also assisted in the erection of nine of the churches of Bradford projected by the society for promoting the building of ten churches, besides helping materially towards the erection of schools. He has been a frequent contributor towards the deliberations of the Church Congress and Social Science Association, and is an ardent advocate of the promotion of education, elementary, religious, and technical, being upon the councils of several colleges and institutions, including the Yorkshire College at Leeds, and the Victoria University. Mr. Powell married, in 1858, Annie, daughter of Mr. M. Gregson, of Liverpool, but has no family.

Horton Old Hall, a view of which is given in this volume, is the residence of Mr. Powell while in Yorkshire. It is a substantial and characteristic example of the period of its erection, namely, that of the reign of Charles II., and, in the hands of its recent possessors, it has been preserved in excellent condition. The arrangements of the hall are those usually found in similar examples of the domestic



HORTON OLD HALL.

(Interior.)

architecture of the period, and comprise central hall open to the roof, with oaken gallery admitting to the retiring rooms above, also eastern and western wings, containing comfortable apartments such as are not always found in modern residences. The hall or "house-body" contains a fine mullioned window, is wainscoted in oak of beautiful colour, and contains the armour and other relics previously alluded to, also a small collection of family portraits, including those of Abraham Sharp, the mathematician; the Rev. Thomas Sharp, M.A.; Archdeacon Sharp, the son of Archbishop Sharp; and others.

The fireplace with its surroundings forms an interesting feature of the hall. Above it are suspended a small collection of ancient armour, swords, pikes, and lances; the head-pieces worn by John Sharp, the Royalist, and his son, Lieutenant Sharp, during the Civil Wars; also several other interesting mementoes of that period. In an adjoining apartment there is a fine portrait of Hogarth, painted by himself; an antique specimen of needlework and embroidery, probably three centuries old; and many articles of *vertu*, bespeaking the taste of the owner.

There are two staircases to the upper floors, both of which are of polished black oak, as, indeed, are the furnishings generally. The library is upon the upper floor, its contents showing unmistakably that the former owners of the Old Hall were possessed of antiquarian tastes, and were great collectors of books and manuscripts. Many of the former are in the original bindings. Amongst this class is a fine copy of the "Summa Hostiensis," dated 1477, and printed by Ludovici Hohennang. It is interesting as exhibiting the transition state between the writing and printing of books, the body of the work being printed, whilst the head-lines and capital letters are illuminated by hand, in red ink. There is also a fine copy of Matthew's Bible, printed in 1539, and many others. In another apartment is preserved a valuable collection of early MS., several dating back to the 13th

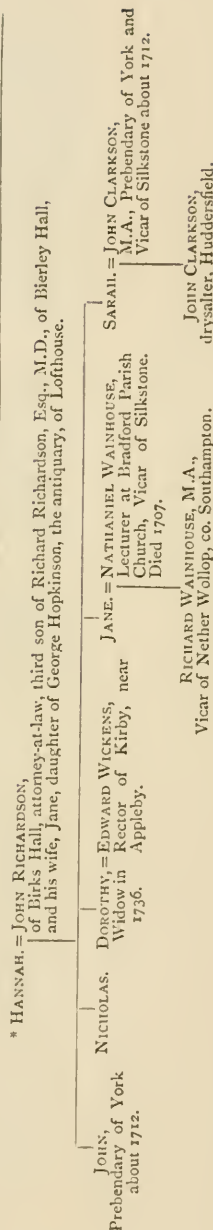
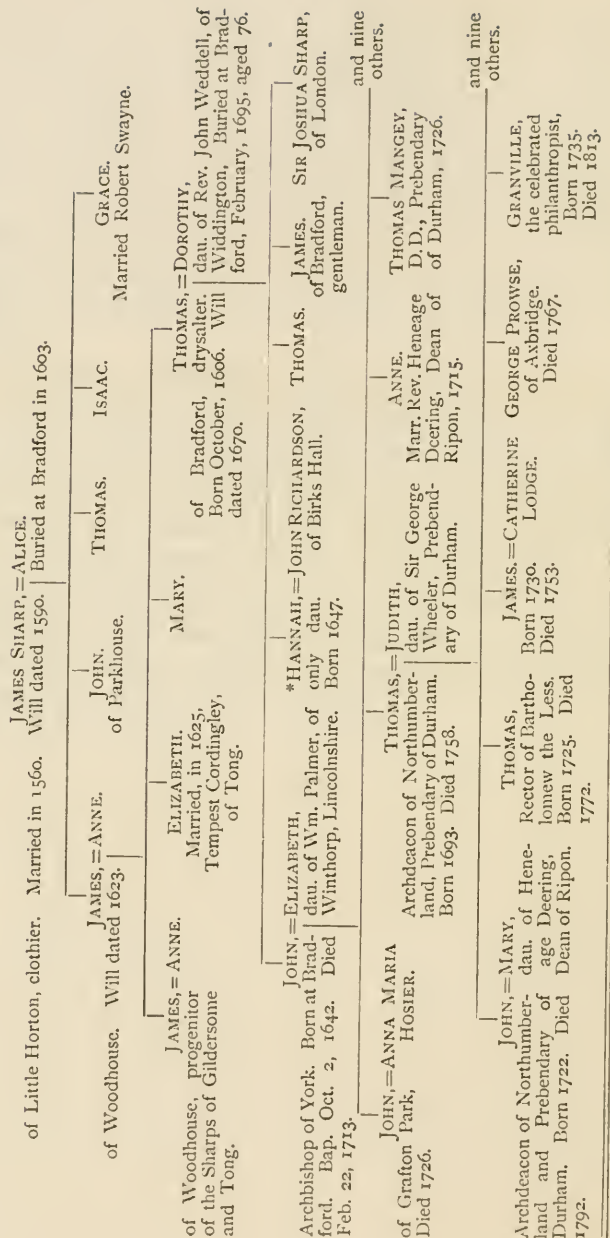
century. One of the most beautiful of these is a Roman missal, written on parchment of such extreme fineness and in such minute text as to be no bulkier than a good-sized printed Church Service of the present day. One of the corridors contains a large triptych taken from a Spanish monastery, and is one of the treasures of the Old Hall. It is divided into three folding leaves, containing compartments depicting various scenes in the life of our Lord, illuminated in mediæval workmanship, probably of the 15th century. The hall also contains a few choice examples of the early Masters.

An adjoining bedroom contains a massive and richly-carved oak bedstead, which, tradition has it, once rested the limbs of the Protector during his brief residence at Horton Hall—the home of the Parliamentary branch of the family. So far as we are aware, however, there is no record of Old Noll ever having honoured Bradford by his presence.

We may add that Mr. Powell possesses many of the antiquarian tastes of his immediate predecessors at the Old Hall, but his more active interest in current topics prevents his prosecuting the study of archæology.

Pedigree of Archbishop Sharp.

ARMS: The arms of Sharp were granted to Archbishop Sharp in 1691, and were those used by the elder branch of his family, the bordure being granted or to the Archbishop as his peculiar distinction.



CHAPTER X.

ARCHBISHOP SHARP, AND HIS FAMILY.

The Sharps of Horton and Woodhouse—Connexion between the families attempted by Granville Sharp, the philanthropist—The line of James Sharp, of Woodhouse, traced—Thomas Sharp, drysalter, Bradford—His son, John Sharp—His elevation to be Archbishop of York and Metropolitan of England—Archbishop Sharp's death in 1713—His family—Thomas Sharp, Archdeacon of Northumberland—John Sharp, Prebendary of Durham and Archdeacon of Northumberland—Granville Sharp, the celebrated philanthropist and friend of the slave.

This chapter we propose to devote to that branch of the Sharp family of which John Sharp, Archbishop of York, and Metropolitan of England, was a member, and from whom sprang two archdeacons of the Church, and the celebrated Granville Sharp, the philanthropist and friend of the slave.

Although the connexion has not been clearly established either by the indefatigable Thoresby, the College of Arms, or by more recent researches made for that purpose, there is no question as to there having been a close relationship between the Archbishop's branch of the family and that to which Abraham Sharp belonged. The Archbishop's branch traces its origin from Parkhouse, North Bierley, about three miles

from Bradford, the Archbishop himself having been born in Ivegate, one of the original streets of the town of Bradford. Abraham Sharp's family resided at Horton, about a mile distant.

From existing records, it is shown that James Sharp, of Little Horton, clothier, had a wife, Alice, and had a farm and lands at Casley, probably situate near to Woodhouse, in North Bierley. James, the historian of Bradford, erroneously describes these lands as at Calverley, but that name does not occur in James Sharp's will, dated 18th August, 1590, and proved at York the 28th January following. The first passage of the will reads thus:—After giving his wife, Alice, her thirds, he bequeaths to his daughter Grace “six poundes, thirtene shillings, and fourepence, which shall be paid to her by my son James within one half yeere after shee bee marryed, without fraud, covine, or delaye, for which I wyll that the sayde James shall have in lewe and recompense of the said some so much of those goods which are at Casley at this instant, set forthe by fower indifferent and chosen men, as may in value extent to six poundes, thirtene shillings, and fourepence.” Testator then devises half of his farm at Casley to his wife for life, unless she marry again, in which event he hopes she will, “afore the same, consider, for the benyfyting and quietness of the said James, her sayd sonne, to let hym have the sayd moytie for his reasonable rente.” All the rest of his goods the testator gave to John, Thomas, Isaac, and Grace, his natural and lawful children, to be equally divided among them.

It is therefore almost certain that James Sharp, the elder, described as of Little Horton, migrated to Woodhouse, in North Bierley, and was the first to settle there. His son, James, succeeded him at Woodhouse, and became the father, among others, of Thomas Sharp, who removed to Bradford, and was the father of Archbishop Sharp.

The following Notes are copied from a MS. of Granville

Sharp's, at one time in the possession of the Rev. Samuel Sharp, vicar of Wakefield, 1810 to 1855 :—

January 2nd, 1798.

Dr. John Sharp, Archbishop of York, was the son of Thomas Sharpe, of Bradford, in the county of York, where he was born on the 16th February, 1644-5.*

Thomas Sharpe was born on the 26th October, 1606, as appears by the Parochial Register of Bradford, being the son of James Sharpe, of Woodhouse, in the township of North-bierle, in whose will, dated 22nd September, 1623, his son, Thomas, is mentioned as being then under age, for he bequeaths to two trustees some land for the use of his son, Thomas, in lieu of his child's portion; and an elder son is mentioned in the same will, whom he calls James, my son and heir apparent.

In the said will he mentions also his brother, John Sharpp, and Isaac Sharppe, and all these names of James Sharpe, John Sharpe, and Isaac Sharpe are mentioned in the will of James Sharppe, of Little Horton, dated 18th August, 1590, as being his children, viz., James Sharpe, John Sharpe, Thomas Sharpe, and Isaac Sharpe; which proves that James Sharpe, of Little Horton, who died in 1590, was the common ancestor of both the families of Sharp, of Woodhouse, near Bierley, and of Little Horton; and that the first John Sharp in the pedigree of the latter, delineated by Thoresby in his "History of Leeds," page 36, was brother of the said James Sharp, of Woodhouse, in North Bierley, the ancestor of Archbishop Sharp.

In the assessment of the land and property tax of 1704, which included the township of North Bierley, occur the following entries—

Dr. Richard Richardson	...	...	...	£3	12	6
Do. for my Lord Archbishop's land...	...	...	...	0	16	0
Mr. James and Mr. Joshua Sharp	...	...	...	1	13	3

It would thus appear conclusive from this that Archbishop Sharp inherited from his father lands at Woodhouse, which were then in the tenancy of Dr. Richardson.

James Sharp, of Woodhouse, whose second wife was named

* The Archbishop was baptised on October 2, 1642, as appears by the registers of the Bradford Parish Church. It is singular that this error should also occur in the Life of the Archbishop, written by his son.

Amie, died in September, 1623, and his will was proved the 9th January following. After providing that his debts and funeral expenses be defrayed out of his goods and chattels, he devises that

Amie, now my wife, shall have one-third part of my goods and chatills in full satisfaction of her interest in the same. I give unto, Elizabeth Sharpe, my daughter, all interest for term of years in one close of land, called Over-royde, at Woodhouse aforesaid, which I have of the demise of John Sharpe, my brother, for certain years yet to come, upon conditions to be voyde if the said John Sharpe, his executors, &c., pay unto me or my assigns the sum of £13 upon the first day of December next ensuing the deed. Elizabeth shall have the said sum of £13 on such redemption of the said close. I give to Mary Sharpe, my daughter, all the tithe and interest in one close of land called Deanhill, at Woodhouse aforesaid, which I had on the demise of William Rodley, deceased. I give to the said John Sharpe, my brother, 20s., and to Isaack Sharp, my brother, also 20s. I give the said Elizabeth Sharpe and Mary Sharpe residue of my goods and chatills, to be divided between them. My will and mind is that James Sharpe, my son and heir, shall have to him, his heirs, &c., for ever, all those two closes of land called Middle Croft and Weststaffe, one or half part of a close of land called the Intake, at Woodhouse, which are parcells of land I purchased of Martin Fether and Isabel, his wife. I give to William Pollard and Thomas Gibson, of Northbierlie, aforesaid, yeoman, to their heirs, &c., for ever, all those 3 closes of land called Blakleyes, Robyn Close, and Flectyng, in Northbierlie aforesaid, adjoining the land of Nicholas Pollard on the west part, and upon the lands of Richard Richardson of the east part, and now in the occupation of me, the said James Sharpe, to dispose of the same, and give the money to Thomas Sharpe, my donee, in liewe of his child's portion and preferment. I commit the tuition of all my younger children to the said Amie, my wife, during their minority, and I make my said wife Amie, sole executrix.

Witnesses—WILLIAM POLLARD,
THOMAS GIBSON,
NICHOLAS POLLARD,
ABRAHAM LISTER.

His brother John was living at Parkhouse in 1642, the year of the first siege of Bradford, as is shown by the following memorandum, a record of that disturbed period:—

Received this x7 day of January, 1642, by the appointment of Sr Thomas ffairefax, Knight, of John Sharpe, of Parkhouse, the sume of

xxs., which is lent upon the publik faith for the Defence of Religion, the Lawes of the Land, the King's Matie and the privelidge of Pliament accordinge to an Ordinance in that behalfe.

(Signed)

JEREMYE BOWER.

Parkhouse is closely adjoining to Woodhouse.

A third James Sharp, this being evidently the favourite name for the eldest son of the Sharps of Woodhouse, succeeded his father, and became the progenitor of the Sharps of Gildersome and Tong, who afterwards settled at Bradford, and are now represented by Dr. Sharp, F.R.S., of Rugby, Rev. John Sharp, M.A., Vicar of Horbury, and the Rev. William Sharp, M.A., Mareham Rectory, Lincolnshire.*

There are many Sharps in the Midland counties, sprung from the Bradford Sharps, who use the arms of the Archbishop, and especially in the counties of Nottinghamshire and Leicestershire.

Thomas Sharp, the second son, followed the trade of a drysalter and oil dealer in Bradford. The above business of drysalter, or "salter" by abbreviation, was common in Bradford in those early days, and must have been a source of profit, as several families, the Stansfields and others, derived from it considerable wealth. The house in which Thomas Sharp resided, and in which his eldest son, the Archbishop of York, was born, was situated upon the site of the building adjoining the Unicorn Inn, in Ivegate.

Thomas Sharp married Dorothy, daughter of John Weddell, rector of Widdington, Yorks, and her brother, John Weddell, settled in Bradford as an attorney. Besides the future Archbishop, Thomas Sharp had several children, viz., Hannah, Thomas, James, and Joshua. The only sister of the Archbishop married John Richardson, of Birks Hall, Bradford, attorney-at-law. James resided in Bradford in

*The line of this branch of the Sharp family is traced in Cudworth's "Rambles Round Horton," from which many of the above particulars are taken.

competence; Joshua received the honour of knighthood in London.

The Archbishop's father and mother were religious and hospitable people, but were of a different way of thinking upon the disputes of those days. Thomas Sharp was inclined to Puritanism, and much favoured the Parliamentary party, being himself in great favour with Lord Fairfax, who made his abode at the house in Ivegate when in the neighbourhood. Among other expressions of his favour, the General is said to have offered a commission to his host, which probably might have been accepted had not his wife, who was a strenuous Royalist, stoutly opposed the proposal.

From his parents the future Archbishop early received those religious impressions which were never effaced. He was sent at an early age to the Bradford Grammar School, and while there his father had him taught a system of shorthand for the purpose of taking down every Sunday the sermons he heard at the Parish Church, and these he was called upon to repeat to the family each Sunday evening. This peculiar acquirement the Archbishop turned to good account in his maturer years. He was never at any other school than that of his native town, and he made such progress that at fifteen years of age his father determined to send him direct to the University and maintain him there for seven years. He was accordingly admitted to Christ College, Cambridge, in April, 1660, just before the restoration of the King, his tutor being Abraham Brooksbank, afterwards vicar of Bradford.

While at Cambridge young Sharp was not idle, for in addition to classics and divinity he seemed to have made some progress in the study of chemistry and botany. In 1667 he left Cambridge owing to an attack of illness, and returned to his father's house at Bradford, to take the chance of preferment in some form. During his stay in Yorkshire the future Archbishop was a candidate for the curacy of

Wibsey, but a more successful competitor obtained it. After being raised to the archiepiscopate he invited the incumbent of Wibsey to dinner, and paid him the most marked attention as the providential cause of his own elevation. He presently afterwards received the appointment of domestic chaplain to Sir Heneage Finch, then Solicitor-General, who ever afterwards became his patron and friend.

Under his patron's roof, in Kensington House, young Sharp zealously continued his studies, and received valuable assistance from Sir Heneage Finch. In 1669 he took his M.A. degree, but again, owing to the closeness of his application to study, he was obliged to return to Bradford, and received benefit by the change. The opportunity occurred also of taking a last leave of his father, who was declining apace, and who died about a month afterwards, namely, in the year 1671.

Will of Thomas Sharp, father of the Archbishop.

(Dated 5th September, 1670.)

After the usual preliminaries, he bequeaths to his wife, Dorothy, £300 out of his personalty, besides a third part of all his lands for life, or if she pleases, she may have a third part of his personal estate in lieu of £300, and have the house they dwelt in, and all the garden for life. He gives to John Sharp, his eldest son, his dwelling-house and appurtenances (garden, croft, &c.), in Ivegate; also a close adjoining Bradford Mill Dam, called Bower Howme, which he purchased of Mr. Ellison, and another close in Little Horton, called Lawe close, bought of Thomas Cooke. He gives to Thomas, his second son, six closes, viz., Upper Bower Royde, Nether Bower Royde (the one lying above Brick Lane, the other below), Hawkhead Close, or Sylbrigg Close, purchased of Thos. Cooke; two closes called Town End Closes or Milln Cliffs; another close called Sommer Butts and Long Lands, lying near to Sylbriggs, which he purchased of Chrstr. Frickleton, the said Thomas to have £100 in money if he is a good son when he sets up trade for himself, if there be hopes of him. He gives to James Sharp, his third son, houses in Kirkgate which the testator lately built or purchased of Wm. Hemsworth; also a close called Marris Croft or Lower Millne Holme, bought of *Ezekica* Taylor, gent.; also one close called the Bricks or Brecks, in Manningham, bought of Susan Fearnley. He

gives to Hannah Sharp, his only daughter, £350 and two closes called Cow Pastures or Bowling Closes, in Bowling Yate. He gives to Joshua Sharp, his youngest son, the house next the one he (testator) lives in, in the occupation of James Snowdon and aunt Alice Dighton; and a close called Mucky Close, in Millne Cliffe, bought of Susan Fearnley, besides £250 in money. Testator committs the tuition of his youngest children, James and Joshua, to his wife, and appoints her sole executor. He desires if she marry again that she will be good to James and Joshua. He gives to poor of Bradford £3, which his wife is to distribute as she thinks fit; his brother-in-law, John Weddell, to assist in the distribution, and to have 20s. for a ring.

Witnesses—JOHN WEDDELL.

ABRAM BROOKSBANK.

Returning to the home of Sir Heneage Finch, now Attorney-General, John Sharp's patron procured him the Archdeaconry of Berkshire, he being then only twenty-eight years of age. Upon Sir Heneage Finch attaining the woolsack in 1673, his good offices towards his favourite chaplain were again exercised, and in the year 1675, he disposed of three preferments upon him, namely, by appointing him a prebend of Norwich, vicar of St. Bartholomew's, and rector of St. Giles's-in-the-Field's, all of which preferments were accompanied with further deeds of kindness.

It was as rector of St. Giles's that Dr. Sharp first won fame. During this period James II. had issued an order that the clergy should not preach on Popery, but the doctor notwithstanding preached his annual sermon, for which the King ordered the Bishop of London to suspend him. The Bishop refused, and this led to the sending of the Seven Bishops to the Tower of London, and then to the abdication of James.

Towards the end of the spring of 1676 Dr. Sharp married Elizabeth, daughter of William Palmer, Esq., of Winthorpe, in Lincolnshire, the marriage being solemnised by Dr. Tillotson, his intimate friend — another distinguished Yorkshireman who filled the archiepiscopal throne as Archbishop of Canterbury. Dr. Sharp's own elevation to the

Archbishopric of York took place in 1691. By the influence of Lord Nottingham he had been promoted to the deanery of Canterbury in 1689, vacant by the elevation of his friend Tillotson, and in the summer of 1690 he visited Bradford, where his mother still resided. In May, 1691, the aged Archbishop of York, Lamplugh, died, and, by the joint influence of Lord Nottingham and Archbishop Tillotson, Dr. Sharp obtained the see. He was only in his forty-ninth year when he mounted to the archiepiscopal throne of York.

Soon after his consecration he first drew up a short account of the most material things which had ever happened to him till that time, and which laid the foundation for the Archbishop's diary, from whence was drawn material for the "Life of Archbishop Sharp," written by his son Thomas, Archdeacon of Northumberland. Soon after the accession of Queen Anne, when the Archbishop began to have more business upon his hands, his memoranda grew more frequent and particular, and instead of the weekly account he kept a proper diary or journal, which from the year 1702 to 1713, the last eleven years of his life, makes up five volumes quarto, all written in his own shorthand.

Archbishop Sharp held the Archiepiscopal See of York longer than any of his predecessors since the Reformation, viz., above two and twenty years. During that long period the conscientious manner in which he discharged its duties has long ago become historical. Although we cannot here follow up his career, prominence may be given to two rules which at the outset he laid down for his own guidance—the first being that no other but a Yorkshire clergyman should hold a benefice in his gift; the other rule was, never to meddle in the election of members of Parliament. In looking after his diocese and the clergy in it he has had no successor more industrious; while as a preacher he was especially renowned. His published works are principally sermons,

and at one time he was remarkably prolific. He was also an industrious collector of coins, and was a great friend of Ralph Thoresby, the antiquarian. Archbishop Sharp died at Bath on February 2nd, 1713, in the seventy-first year of his age. He is interred at the Cathedral at York, where a sumptuous monument is erected over his remains, with the following inscription:—

M. S.
 Reverendissimi in *Christo* Patris
 JOHANNIS SHARP, ARCHIEPISCOPI EBORACENSIS,
 Qui
 Honestis parentibus in hoc comitatu prognatus
Cantabrigiæ optimarum Artium studiis innutritus
 Tum soli unde ortus
 Tum loci ubi institutus est, famam
 Sui nominis celebritate adauxit.
 Ab Academia in domum Illustr^{mi} Dni *Heneagi Finch*,
 Tunc temporis Attornati Generalis
 Summi postea *Angliæ* Cancellarii
 Virtutum omnium altricem fautricemque evocatus
 Et Sacellani Ministerium diligenter obiit
 Et sacerdotis dignitatem una sustinuit.
 Talis tantique viri patrocinio adjutus
 Et naturæ pariter ac doctrinæ dotibus plurimum
 commendatus
 Peracto rite munerum ecclesiasticorum cursu
 Cum Parochi, Archidiaconi, Decani officia
 Summa cum laude præstitisset
 Ob eximia erga Ecclesiam Anglicanam merita
 Quam iniquissimis temporibus magno suo periculo
 Contra apertam Pontificiorum rabiem
 Argumentis invictissimis
 Asseruerat, propugnauerat, stabiliverat
 Apostolicæ simul veritatis præco, ac fortitudinis æmulus
 Faventibus *Gulielmo* ac *Mariâ* Regibus
 Plaudentibus bonis omnibus
 Ad Archiepiscopalis Dignitatis fastigium tandem
 evectus est.
 Nec hujusce tantum provinciæ negotia satis ardua
 feliciter expediit
 Sed et *Annæ* Principum optimæ tum a consiliis tum ab
 eleemosynis fuit
 Quas utcunque amplas, utcunque diffluentes
 Ne quem forte inopum à se tristem dimitteret

De suis sæpenumero facultatibus supplevit.
Erat in sermone apertus, comis, affabilis.
In concionibus profleuns ardens, nervosus.
In explicandis theologiæ casuisticæ nodis
Dilucidus, argutus, promptus.
In eximendis dubitantium scrupulis
Utcunque naturæ bonitate ad leniores partes aliquando
propensior
Æqui tamen rectique custos semper fidissimus.
Primævâ morum simplicitate
Inculpabili vitæ tenore
Propensâ in calamitosos benignitate
Diffusâ in universos benevolentîâ
Studio in amicos perpetuo ac singulari
Inter deterioris sæculi tenebras emicuit
Purioris ævi lumina æquavit.
Tum acri rerum cælestium desiderio flagrabat
Ut his solis inhians, harum unice avarus
Terrenas omnes neglexerit, spreverit, conculcârît
Eo erat erga Deum pietatis ardore
Ut illum totus adamaverit, spiraverit
Illum ubique præsentem
Illum semper intuentem
Animo suo ac ipsis ferè oculis observaverit.
Publicas hasce virtutes domesticis uberrime cumulavit
Maritus et pater amantissimus
Et a conjuge, liberisque impensè dilectus.
Qui ne deesset etiam mortuo pietatis suæ testimonium
Hoc marmor ei mærentes posuerunt.

Of his marriage with Elizabeth Palmer the Archbishop had fourteen children, seven sons and seven daughters, of whom, however, two only of each sex survived him. Thomas, his younger son, was made Archdeacon of Northumberland in 1722, and was no less distinguished than the Archbishop had been for integrity, piety, and a conscientious discharge of his duty. His writings are very numerous. Among the most valuable is a life of the Archbishop, which includes a collection of many of his letters and other papers. He married Judith, youngest daughter of Sir George Wheler, a prebend of Durham, and died in 1758, having been the father of a numerous offspring, of whom five sons and three daughters arrived at maturity. His eldest son, John, succeeded to his

father's principal dignities in the church, viz., as Prebendary of Durham and Archdeacon of Northumberland. He was also vicar of Hartburn, and perpetual curate of Bamburgh. He is distinguished in the records of British humanity at Bamburgh Castle in Northumberland—which, as a charitable asylum, has a history almost unparalleled in the kingdom.

Bamburgh Castle played an important part in the Wars of the Roses; the battles of Towton and Hexham, together with the siege of Bamburgh Castle, which surrendered to King Edward IV., tending to place the crown more firmly on that monarch's head. Although of very ancient foundation, the castle acquired its present interest from its bequest by Lord Crewe, Bishop of Durham, along with considerable estates in Durham and Northumberland, for the purposes of benevolence, the augmentation of livings, the founding of schools, &c. The funds seem to have been faithfully disbursed by the trustees, but not upon any permanent system until Dr. John Sharp succeeded to his father's position as chief of the trustees, and took its affairs into his own management.

The origin of the beneficent efforts of Dr. Sharp at Bamburgh is graphically told in the following copy of a letter from Dr. Sharp to John Ramsay, Esq., and given in the "*Life of Archbishop Sharp*" by his son:—

Copy of a Letter from Dr. Sharp to John Ramsay, Esq.

SIR,

You have so overpowered me by the handsome things you have been pleased to write, so far above any deserts of my own, that I am at a loss what answer to give, or how to thank you as I ought. And as you have so kindly interested yourself in what has been done here, perhaps a little history of the gradual improvements will not be disagreeable to you. It was owing to the peculiar situation of this castle and accidental circumstances, more than to any other cause, that so many charities have been thought of and instituted here. In 1757, a part of the old tower being ready to fall, my father, in the last year of his life, got it supported, merely because it had been a sea-mark for ages, and consequently, as such, beneficial to the public. I succeeded him in the trust. The children of the poor wanted education, therefore schools were

necessary; and where so proper as under the eye of the trustees? The rights of the latter were suffering for want of manor courts being held, to remedy which a court-room was fitted up, and other accommodations made for that purpose, where courts are held regularly twice a year. There was no house belonging to the minister of the parish; the trustees therefore (the living being in their gift) consented to be at an equal expense with my brother, who was then the incumbent, in fitting up rooms for that purpose.

On my brother's death I succeeded to the living, and, as he had left me his library, I sold it to the trustees in order to its being made a public library, and applied the money, in part of a larger sum to be laid out by me in land by a deed enrolled in Chancery, as a fund for the perpetual repairs of the great tower. The poor on this maritime coast were frequently much distressed for want of corn, owing to the convenience the farmers had of exportation. This grievance was alleviated by the erection of granaries, and receiving a part of our rents in corn. Once a vessel was wrecked behind the castle, and the crew saved, but the unfortunate master, after having escaped the perils of the sea, died of a damp bed in the village. That the like might never happen again, all shipwrecked sailors (who come) are received here and supplied with every necessary. This was the beginning of our little infirmary, which soon suggested the idea of a general dispensary for the poor, which is particularly useful in this part of the country, as there is no other charity of the kind between Edinburgh and Newcastle. The vicinity of the Fern Islands, and the want of regular soundings without them, pointed out the convenience of regular firing in a fog, and an old gun found in the sand was applied to that purpose, which has answered our most sanguine expectations. The accidental discovery of the ancient well pointed out the convenience of baths, and the infirmary required a variety of them.

The number of wrecks on this particular coast—of vessels that had run for Holy Island harbour in a storm, and had failed of getting into it—and the melancholy sights from the castle of persons wrecked on the islands, and starving with hunger and cold, together with the savage plundering of such goods, &c., as were driven on shore, induced the lords of the manor to try to give every assistance to vessels in distress, and premiums for saving of lives. But how are warlike preparations consistent with charitable purposes? This requires some explanation. The crews of vessels in time of war chased by a privateer are glad to keep as near the shore as they can, and rather run upon it than be taken. Here we have some uncommon local advantages. The deepness of the channel between the shore and the islands, which is sufficient for the largest ships, and the narrowness of that part of it opposite to us, and the elevated situation of the castle, which an enemy's ship cannot well pass but within gun-shot, demonstrate the utility of a battery, of which we have already had some experience, and in case of war shall perhaps have more. By residing a good deal here, I had an opportunity of raising the rents

of the estates considerably, though still with moderation, so as not to distress the tenants ; this raised a farther income for charitable purposes. But, as I can do nothing of myself in the trust without the concurrence of my brethren, if any praise is due, they are entitled to their share of it, for they readily agreed to every proper plan of charity that was proposed to them.

But as for those improvements which did not strictly come under the denomination of charity, but yet were necessary for carrying on the repairs of the castle, and making it habitable, commodious, and more extensively useful, I have hitherto defrayed the expense of these out of the clear yearly profits of the living of Bamburgh, together with some assistance from my relations and friends. One charity naturally brings on another, and perhaps there are few situations in the kingdom where so many and different charities were practicable, and had so peculiar a propriety, as in this place, and where every incidental circumstance was made subservient to the general plan. The wrecks (that is, such as were not or could not be claimed) supplied us with a considerable quantity of timber, iron, ropes, &c. ; and everything that came ashore was applied to the purpose of the building, in the manner it would answer best. But now, by means of lighthouses, in which we have no concern, and our own institutions for the safety of navigation, our coast is safer than it ever was before, and very few accidents happen. I cannot conclude without repeating my grateful thanks for your very elegant and classical inscription for this place, &c. (which shall be carefully preserved), and also for your well-drawn picture of what a minister of the Gospel ought to be. I am, with compliments to your fellow-traveller, who, I hope, will inherit his father's virtues,

Sir,

Your much obliged,

Humble Servant,

JOHN SHARP.

Dr. Sharp resided at Bamburgh several months in the year, and during his life expended a large part of his own property on the place. He died in April, 1792, having bequeathed an estate, his library, and other property for the preservation of the castle. At Bamburgh Castle are preserved many memorials of the Sharp family. There is a very fine portrait of Archdeacon Sharp, also his ancient Sedan chair ; and in the church a fine monument of him by Chantrey.

William Sharp, another brother, was most eminent in his profession as surgeon in London, where he practised for

thirty-seven years, and was also surgeon at St. Bartholomew's Hospital.

Granville Sharp, the most distinguished of the sons of Archdeacon Sharp, was born at Durham in 1735, and was intended for the London mercery trade. Passing over the details of his younger days, a short outline of his life ought to interest every Englishman. His great works may be classed under four principal heads, viz:—The liberation of African slaves in England; the colonisation of Sierra Leone; the establishment of Episcopacy in America; and the abolition of the slave trade. To these may be added his attempt to reconcile the British colonies with England at the commencement of the American troubles. While his efforts were at various periods directed to one or other of the above objects, his monument as a philanthropist is based upon the self-denying efforts put forth by him in the emancipation of the slave.

It has been customary to place the names of Clarkson and Wilberforce in the front rank in the movement leading to the abolition of slavery; but, without detracting from the good work done by them, it is simply a matter of history that Granville Sharp first struck the blow which severed the chain of the negro slave. Clarkson joined him, and the two together prepared the way and made it possible for Wilberforce to bring the subject before Parliament, and, with the assistance of William Pitt, obtain the desired Acts of Emancipation.

An instance of the length to which disrespect for human freedom had proceeded may be quoted from the newspapers of the period. Thus, in April, 1769, an advertisement appeared in the *London Gazetteer*, in which, among other "goods and chattels," mention was made of "a chesnut gelding, a Tim Whisky, and a *well-made, good-tempered, black boy.*" No wonder that such open dealing in human flesh should have aroused the better feelings of men of Granville Sharp's calibre.

He had about ten trials during five years before Lord Mansfield, Lord Chief Justice of England, for setting free slaves in London, before he succeeded in getting a declaration from the judge that English laws knew nothing of slavery. When the action was brought against him for having "stolen goods" in his possession, Granville Sharp could not persuade a single barrister to take up his brief. All these learned gentlemen said he was in the wrong, and that the chief legal authority was against him. This was true enough, but it had only the effect of spurring the noble-minded man to further effort, one result being that he set to work to study the laws of England for himself in order to defend his own case. Granville Sharp succeeded in his first trial, and then persevered in bringing on a succession of trials by obtaining writs of *habeas corpus* against individual slave-holders; but it was not till after five years of personal fighting in the Court of King's Bench that he obtained a final judgment in his favour. Upon this, about 400 negroes were turned out into the streets by their masters, and in their emergency the whole body went to their liberator, Granville Sharp, who took care of them until he had secured the colony of Sierra Leone for a settlement, and had seen them colonised, although this was not accomplished without involving considerable labour and embarrassment upon the philanthropic promoter.

Granville Sharp's labours were equally conspicuous in other important points affecting the national character, which cannot at length be alluded to here. In addition to his national labours, he was an active promoter of various religious, philanthropic, and literary institutions. He was also a voluminous writer of controversial literature, and was a good linguist. His death occurred in July, 1813, at the age of seventy-eight, and his remains lie at Fulham. A monument was, however, raised to his memory by the African Institution, and executed by Chantrey, in Poets' Corner, Westminster

Abbey, containing an inscription setting forth his many virtues, which is as follows :—

Sacred to the Memory of
GRANVILLE SHARP,
Ninth Son of the Rev. Thomas Sharp, D.D.
Prebendary of the Cathedrals and Collegiate Churches
of York, Southwell, and Durham,
and Grandson of Dr. John Sharp, Archbishop of York.
Born and Educated in the bosom of the Church of
England,
he ever cherished for her Institutions the most
unshaken regard,
while his whole soul was in harmony with the sacred
strain—
“Glory to God in the highest, on earth peace,
good-will towards Men,”
On which his Life presented one beautiful comment
Of glowing Piety and unwearied Beneficence.
Freed by Competence from Necessity, and by Content
from the desire of lucrative Occupation,
He was incessant in his labours to improve the
condition of Mankind,
founding public Happiness on public Virtue
he aimed to rescue his native Country from the guilt
and inconsistency
of employing the arm of Freedom to rivet the fetters of
Bondage,
and established for the Negro Race, in the person
of Somerset,
the long-disputed rights of Human Nature.
Having, in this glorious cause, triumphed over the
combined resistance
of Interest, Prejudice, and Pride,
He took his post among the foremost of the honourable
band
associated to deliver Africa from the rapacity of Europe,
by the abolition of the Slave Trade,
Nor was death permitted to interrupt his career of
Usefulness,
till he had witnessed that act of the British Parliament,
by which “The Abolition” was decreed.
In his private Relations he was equally exemplary ;
and having exhibited through his Life, a model of
disinterested Virtue,
he resigned his pious spirit into the hands of his Creator,

Life and Correspondence

in the exercise of Charity, and Faith, and Hope,
On the 6th day of July, 1813,
in the 78th Year of his age.

READER !

If on perusing this tribute to a private Individual,
thou shouldst be disposed to suspect it as partial,
or to consider it as diffuse,
Know, that it is not Panegyric, but History.

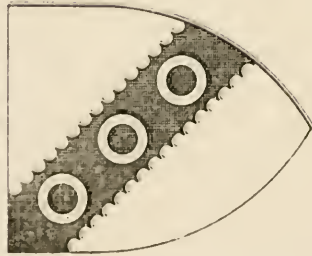
Erected by the African Institution of London. 1816.

Note—Executed by F. L. CHANTREY. The Inscription written by
WM. SMITH, Esq., M.P. for Norwich.



Pedigree of the Clarksons of New York,

FORMERLY OF BRADFORD.



ARMS: Argent, on a bend engrailed sable three annulets, or.
CREST: A Griffin's head couped between two wings, ppr.

CLARKSON = ELIZABETH . . . circ. 1580.

ROBERT, = TRISTRAM = SUSAN ELIZABETH = SAMUEL ELLEN = THOMAS
of Fayre Gappe, Issue. Issue. Issue. Issue. Issue. Issue.
Bradford. Died 1631-2.

Rev. WILLIAM = ELIZABETH SHARP.
Rector of Adel.
Born 1613-4.
Died 1660.
Issue.

MARY = JOHN SHARP.
Born 1615-6. Marr.
1632. Died 1678-9.
Died 1672.

ROBERT = HANNAH
Born 1617-8. TAYLOR.
Marr. 1646.
Died 1695-6.
Alderman
and citizen of
London.
Issue.

Rev. DAVID =
Born 1621-2.
Fellow of Clare
Hall. Died in
croft. Married
1651.

Rev. THOMAS, M.A.,
Rector of Adel.
ABRAHAM,
Mathematician, &c.
Issue.

² ELIZABETH
(widow), dau.
of Matthew
Kenrick.
Married 1663.

HESTER.
Born 1623-4.

DAVID = LADY SANDS.
No issue.

MATTHEW = CATHARINA VAN SCHAIK.
Marr. 1692. Died
1702. Went to
America. Secre-
tary of Province
of New York.

LETTICE.
Born 1632. Died 1653.

KATHARINE.
Born 1672. Died 1757.

ROBERT.
Born 1670-1.

REBECCA = Mr. COMRE.
Born 1665. Died 1744.

GERTRUDE.
Born 1669. Died 1701.

MARY.
Died 1669-70.

ELIZABETH.
Born 1693-4.

DAVID = ANN MARGARET FREEMAN.
Born 1694. Marr. 1724-5.
Died 1751. Member of
Colonial Legislature.

LEVINUS.
Born 1696. Died 1769.

MATTHEW = CORNELIA DE PEYSTER.
Born 1699. Re-married
Marr. 1718. GILBERT TENNENT, and
Died 1739. removed to Philadelphia.
Issue. No issue by second marr.

ANNA.
Born 1701. Died 1779.
Both resided in Holland.

Issue.

CHAPTER XI.

THE CLARKSON FAMILY.

The Clarksons of Bradford—Robert Clarkson, of Fairgap, a substantial yeoman—His family—William Clarkson, his son and heir—Chaplain to Ferdinando, Lord Fairfax—Rector of Adel—John Sharp, secretary to Sir Thomas Fairfax, his brother-in-law—Robert Clarkson, alderman, of London—David Clarkson—Engaged in the siege of Bradford—Appointed to a Fellowship at Cambridge—One of the chief literary champions of Nonconformity—His family—Matthew, his second son, founder of the Clarksons of America—His descendants.

The Clarksons have for generations resided in Bradford or its vicinity, and it is believed were closely allied to the Clarksons, formerly of Kirton, in the neighbouring county of Nottingham. The late Mr. Courthorpe, of the College, Somerset Herald, said that "from a note in one of our books it would appear that this family (of Kirton) was in some way connected with the Yorkshire family, though the connection be not shown." He was also of the opinion that the Yorkshire family was the elder branch. The pedigree and armorials* of the Clarksons of Nottingham

* ARMS: Argent, on a bend engrailed sable three annulets, or.

CREST: An arm in armour, fessewise, holding a sword, from which flows a pennon.

are on record at the College. The pedigree commences about 1500, and comes down to about 1664. They were proprietors of large landed estates, and were long and favourably known in the county.

Very little can be told of the history of the Clarksons of Bradford before the period of the Stuarts, but at the accession of James I. they were in the enjoyment of wealth and "possessed of that moral worth and social influence which caused them to be ranked among the leading inhabitants of the town."

Robert Clarkson, of this family, lived in the Fayre Gappe, a little street leading out of Westgate. This thoroughfare, which still retains its ancient straitness, is probably one of the oldest thoroughfares in Bradford, although at the period referred to, it would be but a mere packhorse road. His residence was near the market-place, in which stood the ancient cross, and still nearer the Pack Horse, almost a copy in miniature of the famous Tabard Inn from which Chaucer's Pilgrims started on their way to Canterbury.

Clarkson describes himself as a yeoman,* and like very many of that influential body of freeholders, was a Puritan. He may have been, and probably was, a manufacturer of woollen cloths, which was an important industry at Bradford at that time. He certainly accumulated or inherited considerable property. He had large estates, not only at Bradford, but at Idle, at Pudsey, and at Manningham. He mentions in his will no less than nine messuages or houses, and thirty-two closes or fields, each of which has its own peculiar designation, also a number of other closes with no distinctive names.†

In 1615, Clarkson was made a warden of St. Peter's Church, an office filled in 1603 by Wm. Clarkson, probably

* That rank of persons who are not distinguished by any other title are called yemen or commoners—Thoresby's Leeds, ed. 1715, p. 95.

† Office of Wills, York.

a member of the same family, and towards the close of his life acted in company with the vicar and others as a trustee for the sale of the Manor of Bradford.

No facts have been ascertained in regard to the later years of his mother, Elizabeth. His brother, Tristram, and his sisters, all married and had issue, but nothing is known of their descendants.

Elizabeth, married Samuel Boothe, January 24, 1601-2.

Ellen, married Thomas English, February 28, 1619-20.

Tristram, married Susan Wilson, September 21, 1629.

Robert Clarkson's death occurred on the 10th March, 1631-32, and the interment was made on the 13th, at St. Peter's,

"That sacred storehouse of his ancestors,
And guardian of their bones."

He had seven children, four sons and three daughters. In the parish register are these entries of their baptism:—

Robert	...	...	June 7, 1612.
William	...	...	April 10, 1614.
Mary	...	...	February 18, 1615-6.
Robert	...	...	February 15, 1617-8.
Sara	...	...	December 5, 1619.
David	...	...	March 3, 1621-2.
Hester	...	...	March 24, 1623-4.

Robert, the eldest, and Sara, died in infancy, and were buried at the Parish Church—Robert, on the 30th September 1614, and Sara, on the 22nd July, 1621. The other children* survived their father.

William Clarkson was the son and next heir of Robert Clarkson. He was born March 13, 1613-14, and was at the time of his father's death a lad of nearly eighteen. Nothing is positively known of his early training, but it is not unlikely

* Inq. p.m. Tadcaster, York, 8th of King Charles, Ap. 23, 1632.

that he and his two younger brothers, Robert and David received the elementary part of their education at the Bradford Grammar School, which was already notable as a place of learning.

We now lose sight of him until the autumn of the year 1644. He was at this time a little over thirty years of age, and was acting as chaplain to Ferdinando, Lord Fairfax. In the same year the parish of Kirklington, in the North Riding of the County of York, having become vacant by the death of Mr. Dagget, Mr. Clarkson was nominated for the place upon the recommendation of Lord Fairfax. It does not appear whether he ever succeeded to this incumbency, but, if he did, he could not have retained it very long, for in the following year, 1645, we find him installed as the Vicar of Adel. As he owed his first preferment to Lord Fairfax while acting as his private chaplain, so it was through his son-in-law, Mr. Henry Arthington, of Arthington, the patron of the living, that Mr. Clarkson was presented to this second benefice—the church of Adel. These facts show the interest awakened by young Clarkson in a man so distinguished in his day as Lord Fairfax.

In this quiet and secluded spot, in the exercise of his ministry, Mr. Clarkson passed the remainder of his life, and was succeeded in his office by his nephew, Thomas Sharp. Mr. Clarkson's death occurred in April, 1660, before he had attained his forty-seventh year, and he was buried on the 28th of the same month in the grounds adjoining the old church at Adel. He was twice married. His first wife was Elizabeth a daughter of Thomas Sharp, of Little Horton, and sister of John Sharp, the Parliamentarian. Elizabeth died on the 6th May, 1650.*

His second marriage was with Frances, a daughter of Mr.

* There seems to be some doubt whether Elizabeth had issue. In Whitaker's *Leeds*, ed. 1816, p. 354-5, chart. Eliz. s.p. The late Mr. Courthorpe, of the College, Somerset Herald, has recorded that Elizabeth had 2 child. bap. at Adel.

Maud, of Bierley. By this later marriage Mr. Clarkson left three children, Sarah, Martha, and Hannah. Frances survived her husband, and, there being no will, was appointed with Major Maud, of Bierley (probably a brother), to administer the estate.

Mr. Clarkson held, probably by inheritance, the Lordship of Idle, including the "Mansion House," called the "Smythies," at Windhill, and the "Chappel" at Idle. This property descended in the family, and was sold in 1714 by Robert Clarkson and Jane, his wife, to Sir Walter Calverley. It may fairly be assumed that Robert was a son of Mr. Clarkson by the earlier marriage.

Mary Clarkson was the elder of the two surviving daughters of Robert Clarkson, and sister of the Rev. William Clarkson, of Adel. The younger sister, Hester, has left no record of herself in the family history. Mary was baptised in the Parish Church at Bradford, on the 18th February, 1615-16, and sixteen years later, on the 12th December, 1632, less than a year after her father's decease, she was married to John Sharp, a son of Thomas Sharp, whose residence was at Little Horton. John was born on the 17th February, 1603-4, and was many years the senior of his wife.

As already indicated, John Sharp, who had frequently served under Sir Thomas Fairfax, after he was made Lord General acted as his private secretary. It is well known that he and his brother-in-law, William Clarkson, were both associated with the Fairfaxes, and it is probable that from their position they were privy to the counsels that produced those great and notable events which have had such a marked influence in all later times. Sharp, subsequently, assumed the business of cloth worker, or cloth manufacturer, which was partly mechanical and partly mercantile, and stood at the head of the industrial pursuits of the period.

By his business tact and the careful management of his estate Mr. Sharp accumulated much wealth, and died full of

years and full of honours, respected by all his neighbours, on Whit-Sunday, 1672. His wife survived until the 30th January, 1678-9.

Robert Clarkson was the second surviving son of Robert Clarkson, and brother of the Rev. William Clarkson and Mary Sharp. Robert was baptised at the Parish Church in his native place, on the 15th February, 1617-18. Of his youth nothing has been recovered, but at the age of twenty-eight he was in London, and was subsequently established there as a mercer. He acquired a large property, the personalty alone being estimated at between £30,000 and £40,000. At one time he was an alderman of London.

He married Hannah, a daughter of William Taylor,* of London. The marriage articles are still extant, and bear date December 22, 1646. The wife of Mr. Taylor was a daughter of the Rev. William Wilson, D.D., of Merton College, Oxford, who had married Isabel Woodhall, a niece of Edmund Grindall, Archbishop of Canterbury, *temp.* Elizabeth.

The date of the death of Mr. Clarkson is unknown. He is described in his will as of "Little Chelsea, in the Parish of Kensington, in the County of Middlesex, Esq." This instrument bears date December 11, 1695, and was admitted to probate February 27, 1695-6. He had a son, Samuel, baptised at St. Faith's, London, November 12, 1647, and buried there January 6, 1653-4; and a daughter, Margaret, who was also baptised at St. Faith's, April 19, 1651. Another son, Samuel, was subsequently born, but of his later history nothing has been ascertained. There were two other daughters, Mary and Hannah. Margaret married Benjamin Dryden, and had issue. Mary married John Knight (son of Sir Ralph Knight, *aide-de-camp* to General Monk), whose sister, Hester Knight, became the wife of John Clarkson, of Kirton, county

* Colonel Chester thought that this family of Taylors was descended from the Taylards of Huntingdonshire.

Nottingham; and Hannah, the third daughter, married Edward Hopton, and had a son, Richard, who married Elizabeth Geers, great-granddaughter of the first Earl of Westmoreland.

David Clarkson was the youngest son of Robert Clarkson, of Bradford, where he was baptised on the 3rd March, 1621-2. From the Grammar School in his native town he went up to Cambridge University. His admission at Trinity College bears date Oct. 22, 1641, where he took his degree in 1644-5.

The stirring events of that period call for some digression in the story of David Clarkson, which may here be made. In 1642 the town of Bradford, being then occupied for the Parliament by Sir Thomas Fairfax, suffered an assault from the Royalist forces under Sir William Savile, who were compelled to retreat to Leeds. In Joseph Lister's narrative of the siege he says:—"As my mother and I walked up the street we met a young gentleman, David Clarkson, leading a horse. My mother asked him where he had been with that horse. Says he:—'I made an essay to go with my brother Sharp (John Sharp, brother-in-law, and Jos. Lister's master), and the army who broke through the enemy's leaguer; but the charge was so hot I came back again, and now I know not what to do.'"

From this it would appear that David Clarkson had returned to his family after the first alarm, and was shut up on the Earl of Newcastle investing the town in June following, when the desperate attempt of Sir Thomas Fairfax to break the cordon was made.

Young Clarkson afterwards returned to Cambridge, where, during the Civil Wars, two hundred Masters and Fellows were expelled for taking part with the King. To one of the vacant Fellowships David Clarkson was appointed by the warrant of the Earl of Manchester, and had the honour of presiding over a community of which the eminent Ralph Cudworth had previously been appointed master. The following letter, written by John Sharp, of Horton, doubtless had

considerable influence in obtaining the preferment. It bears the endorsement:—

"Copy of ye Letter to ye Earl of Manchester."

3rd Oct., 1644.

MY LORD,

This gentleman show by these presents to yr. Lordship hath deserved for his sufferings to be pittied, for his constancy to be rewarded, now since his condicon requires the one no less than it deserves the other. I thought it convenient to manifest that I pity him by desiring yr. honorable assistance to reward him. He was a student in Cambridge till the beginning of this kingdom's troubles, when he was forced by the strict urging of some ceremonies to leave it. Coming into the country he resided at Bradford till that towne was taken and himself in it. Since then, for his affection to the Parliamt. he hath continued to months a prisoner, by wh. he lost both his degree in the University and the benefit of his estate in the country, so that now he is rendered unable not only to provide for the expenses ordinary at the taking of a degree but also to mayntayne himself in the University as heretofore he had done. I desire therefore your Lordship in consideration of the promises you would confer on him such preferment in the College as may both enable and encourage him to continue his progress in his stud'ys, yet no other than what after examination he shall be thought worthy of; and I shall be further engaged.

(Signed)

JOHN SHARP.

David Clarkson left Trinity for Clare in 1645, and on the 5th May of that year was made a Fellow as described. At Clare he received the degree of B.D., and held his position as Fellow until 1651, when he left the University. During his residence in the University he had placed under his care, among other pupils, his sister Mary's son, Thomas Sharp, and John Tillotson, afterwards the Archbishop of Canterbury.

It is not probable that Clarkson had possessed any preferment in the church before he was invited, about 1651-5, to become the minister of Crayford, in Kent. Subsequently, February 13, 1655, he received his appointment to Mortlake, not far from Battersea, in Surrey, and continued to hold this cure till his ejection by the Uniformity Act in 1662. For

several years succeeding this date, his pen was constantly engaged in the religious controversies of the time, and his name is always enumerated among the chief literary champions of Nonconformity.

In 1682 he became the colleague of Dr. John Owen, as pastor of an Independent Church in London, and on Owen's death, in the following year, his successor. Clarkson did not long hold this office, dying rather suddenly at his residence in the Parish of St. Dunstan, Stepney, on the 14th June, 1686, and was buried in Bunhill Fields. His funeral sermon was preached by Dr. William Bates.

Baxter, Ridgely, Howe, and Mead all bear testimony to David Clarkson's worth and abilities. Baxter speaks of him as "a divine of extraordinary worth for solid judgment, holding moderate principles, acquaintance with the fathers, great ministerial abilities, and a godly upright life." Birch, in his life of Tillotson, refers to the singular respect that the Archbishop entertained for him; and De Foe thought that the reasoning in two of Clarkson's works, though often attacked, had never been refuted.

His writings are very numerous, and many of his sermons and discourses were collected and published, in 1696, in one of those folios, at one time to be seen in old Dissenting chapels secured to the desk by a chain.

In 1651 Mr. Clarkson was married to a daughter of Sir Henry Holcroft, Knight, of East Ham, County of Essex, and of Long Acre, County of Middlesex. The Holcrofts were settled for centuries in Lancashire, and have been represented in the Royal Parliament as early as the reign of Edward III. One branch, known in history as that of the Vale Royal, was greatly enriched under Henry VIII., at the time of the sequestration of the monasteries, and received an accession of dignity under Queen Mary, when Sir Thomas Holcroft was made Knight Marshal of England. Another branch of the family established itself at Basingstoke, in

Hants; while still another settled at Hurst, in Lancashire. The Holcrofts at East Ham, Essex, came of the latter branch.

In 1662-3 Mr. Clarkson married again, his wife being Elizabeth, widow of Wolrave Lodwick, and daughter of Matthew Kenrick, of London. The Kenricks have been seated at Woore Manor, Salop, for generations. It is a Welsh family of great antiquity, and claims a descent from David Kenrick, *temp.* Edward III., who was a companion to the Black Prince in the battles of Crecy and Poitiers. He founded the Church of Ashley, County Stafford, in which a brass bears the following inscription:—

In perpetuam Rei memoriam
Manubias Deo,
David Kenricus Pietas ejus memoria
Hoc virtutis Praemium dicavit.

It appears that Mr. Clarkson had eight children, three sons and five daughters, but whether this number comprised his whole family is not known. His will gives no information on the subject. It is singularly brief and hurried, and as his decease was unexpected, it was only executed the day before he died.

The eldest child Letes (Lettice), who bore the name of her grandmother, the wife of Sir Henry Holcroft, was baptised on the 25th May, 1652, at Crayford, Kent, during her father's residence there, and died in March of the following year. Rebecca was married to a Mr. Combe. She died on the 20th November, 1744, aged seventy-nine, having outlived her husband, and was buried in Bunhill Fields Cemetery. There was no issue, it is believed, by this marriage. Another daughter, Mary, died young, in March, 1669, and the two other daughters remained unmarried. Gertrude died in London, April 23, 1701. Her pastor, Dr. Ridgley, preached her funeral sermon, which he also published and

inscribed to Mrs. Elizabeth Clarkson, the venerable relict of Mr. Clarkson. The fifth daughter, Katherine, died at Hitchin, Herts, January 11, 1757, aged eighty-four years. Gertrude and Katherine were both baptised at Mortlake, the former on the 18th November, 1669, the latter on the 4th July, 1672.

Of the three sons—David, Matthew, and Robert—it is known that David married, about 1690, Lady Sands, the widow of Sir William Sands. She survived her husband, and died in 1714, providing by her will that she should “be carried to my grave at night, privately, but decently,” and that the interment should be made in St. Warburgh’s Church.

Of Robert, it is recorded that he was baptised at the Mortlake Church on the 8th February, 1670, and his father’s will bequeaths to him all his books if he would prove a scholar, but neither tradition nor the records reveal anything of his after life.

The other son, Matthew, went to America, and after a short stay in the provinces returned to England. He then preferred a petition to the King for the position of Secretary of the Colony of New York. The petition was referred to the Right Hon. the Lords of the Committee for Trade and Plantations, and upon their recommendation, and as a testimony of his respect for the memory of the Rev. David Clarkson, the father of the petitioner, King William III. caused the commission to be issued. Matthew sailed from the Isle of Wight on board the *Beaver* on the 1st December, 1690, and arrived at New York on Thursday, January 29, 1690-1. Two years later, on the 19th January, 1692, he married Catherina, a daughter of the Hon. G. Gerritse Van Schaick, of Albany, a family of Dutch descent, and became in this way connected with most of the prominent families in the province. Mr. Clarkson retained his office until his death. He and his wife both fell victims to an epidemic, supposed to have been the yellow fever, which suddenly appeared in New York. The exact date of Mrs. Clarkson’s

death is not known. Her husband, it is said, survived her a few days only, and died July 20, 1702.

Many of his descendants have held high and responsible positions in America, the duties of which they have discharged with fidelity and ability.

Matthew Clarkson, of New York, was a great-grandson of the Secretary, and was born on the 17th October, 1758. At the early age of seventeen he entered the army of the United States, during the War of Independence, and served successively on the staff of Arnold and Lincoln, with the rank of major, and at a later date, when Lincoln was made Secretary of War, Clarkson was made the Assistant Secretary.

Few officers were as often in the face of the enemy, and on such memorable occasions. As he participated in two of the greatest reverses of the Americans—the defeat on Long Island, and the fall of Charleston—so he was engaged in two of their most brilliant achievements—the capitulation of General Burgoyne and of Lord Cornwallis.

At the close of the war, Major, now Lieut.-Colonel, Clarkson, with a character ever conspicuous for its uprightness and integrity, and enjoying the friendship of Washington, Hamilton, and Jay, returned to civil life. He manifested a deep interest in the politics of the commonwealth; was elected to both Houses of the New York State Legislature; and as a candidate of the Federal party for the United States Senate received a majority of the votes of the Upper House, but failed in joint ballot.

He was President of the Bank of New York for twenty-one years. He was among the earliest promoters of the free school system in his native State; for forty-one years a Regent of the University; for thirty years Governor of the New York Hospital; and first Vice-President and one of the founders of the American Bible Society.

Mr. Clarkson was twice married. His first wife was Mary, the only daughter of Walter Rutherford, of Scotland, later

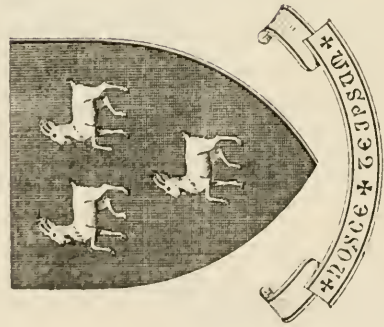
of New York, a member of an ancient and once powerful family in Teviotdale. His second wife was Sarah, a daughter of Samuel Cornell, of the Council of the Province of North Carolina. One of Mrs. Clarkson's sisters, Susan Cornell, married Henry Chads, captain in the Royal Navy, and was the mother of the Admiral, Sir Henry Ducie Chads, G.C.B. The earlier marriage of Mr. Clarkson took place May 24, 1785, and the later, February 14, 1792.

The eldest child, Mary Rutherford Clarkson, married, July 29, 1807, Peter Augustus Jay, the eldest son of the Hon. John Jay, the *first* Chief Justice of the Supreme Court of the United States, and one of the three American Commissioners—the other two were John Adams and Benjamin Franklin—who negotiated the Treaty of Peace with Great Britain at the close (in 1783) of the War of Independence.

Mr. Clarkson died on the 25th April, 1825. The last years of his life were principally devoted to the promotion of the interests of those institutions which reflect so much honour on the religion, the education, and the benevolence of his country. Chancellor Kent said of him that—"It was his business and his delight to afford consolation to the distressed, to relieve the wants of the needy, to instruct the ignorant, to reclaim the vicious, to visit the fatherless and the widow in their affliction, and to keep himself unspotted from the world." And the Hon. De-Witt Clinton, the Governor of the State, in a memorial address, said—"As long as benevolence is respected among men, as long as piety is held in veneration, so long will the name of Clarkson be ranked among the excellent men who have illustrated in their lives the greatness of goodness."*

* "Institution of the Society of the Cincinnati."

"A History of the Bank of New York."



Pedigree of Stansfeld of Stansfeld, Sowerby, Horton, and Bradford.

ARMS: Sable, three goats, trippant, argent.
 CREST: A demi lion rampant argent.
 MOTTO: Nosce teipsum,

JAMES STANSFELD, = MARTHA BENTLEY,
 of Stansfeld Pond. Born 1592. Married at Halifax, 1612.
 Died 1643.

JOSIAS STANSFELD, = MARTHA SWAYNE,
 of the Breck, Sowerby, eldest son and heir. Born 1619. Died 1702. Had issue seven sons, and lived to see the seventh son of his seventh son. Buried at Sowerby. February, 1684.

(1st wife) MARTHA SHARP, = JOSUA STANSFELD, = JUDITH WOOD (2nd wife),
 dau. of John Sharp, of Horton. second son, of Horton. Married at Bradford,
 secretary of Fairfax. Died February, 1733-4. Married, 1677.
 1672. Died in childbirth 1674. aged about 86.

No issue. STANSFELD.

—and others.

SAMUEL STANSFELD, = MARY CLARKSON,
 third son, of Bradford, dry-
 salter. Born 1648. Married
 1675. Died September 1st,
 1727, aged 78. Wm. Clarkson.

ELIZABETH SHARP, = ROBERT STANSFELD, = ANNA BUSFELD,
 of Horton (1st wife), dau. of Bradford, drysalter, of Ryshworth (2nd wife),
 of Rev. Thos. Sharp, M.A. Baptised at Bradford, Married 1723. Died 1757.
 Married 1703. Died 1722. March 22nd, 1676. Will dated Sept. 8th, 1744.

No male issue. ROBERT STANSFELD,
 of Fsholt. (*See Sharp pedigree.*)

CHAPTER XII.

THE STANSFELD FAMILY.

The family of Stansfeld—James Stansfeld, of Stansfeld Pond—Josias Stansfeld, of the Breck—Marries Martha Swayne, of Horton—Joshua Stansfeld, his eldest son, of Horton—Marries Martha Sharp, of Horton—The Stansfelds of Horton—Samuel Stansfield, of Bradford—His son, Robert Stansfield, of Bradford, drysalter—Marries Elizabeth Sharp, of Horton, first wife—Issue, Faith, married to R. Gilpin Sawrey—Marries for second wife Anna Busfeild, of Ryshworth—Issue, Robert Stansfield, who purchased Esholt Hall—His family—Esholt Hall described.

The family of Stansfeld, which, like that of Clarkson, was intimately associated with the Sharps by marriage, traces its descent from Wyons Maryons, Lord of Stansfeld, who came with the Conqueror from Normandy, and ultimately settled at Stansfield Hall, in the Vale of Todmorden.

Stansfield was part of the manor of Wakefield, granted by the Crown to Earl Warren, who claimed free chace and warren therein, and produced a charter, dated 27th January, 37 Hen. III. (1253), from that King, granting him free warren in all his demesne lands, which he already had, or should in future acquire. And even afterwards, when the sub-infeudatory manor of Stansfield had been created, the sub-tenant, John Thornhill, granted to William, Earl Warren, right to keep all his wild beasts, deer, and fowls in his land

of Sowerbyshire, of which Stansfeld was a part, by the proper forester of the earl; in exchange, that the said John Thornhill and his heirs should take yearly five stags of grease, and five hinds in winter, and make their whole commodity of all their lands and woods in Sowerbyshire, at their pleasure, without contradiction of the earl and his heirs.

The family of Stansfeld has extensive connections, having branches at Sowerby Halifax, Bradford, Leeds, Elland, Wadsworth, Burnley, in the county of Surrey, in North Britain, and elsewhere. The pedigree given, however, only refers to the immediate progenitors and other members of the family which settled at Horton and Bradford, and with the members of those families only do we propose to deal.

For the ability to do this we are indebted to the exhaustive "History of the Stansfeld Family," prepared and published by Mr. John Stansfeld, of Leeds, which, as a family history, is unique. Either in regard to its varied and exhaustive contents, or the superb character of the published volume, this compilation has laid the members of the Stansfeld family under great obligations to its author. As to the spelling of the name, it may be remarked that Samuel Stansfeld, the third son of Josias Stansfeld, of Breck, was the first to introduce the vowel "i" into the family name.

James Stansfeld, of Stansfeld Pond, first named in the pedigree, was the son and heir of Nicholas Stansfeld, born 1592, married, in 1612, to Martha, sister of Richard Bentley, of Sowerby. Sowerby Dean and Pond are both ancient names for what is now called the Lodge, Triangle, at Sowerby, the mill attached thereto being still known as Stansfeld Mill. James Stansfeld made his will February 22, 1648-9, and it was proved May 29, 1650. He was evidently a man of substance, as he wishes all his debts to be paid, "Seeing that I have sundry goodly sums of money owing to me by sundry persons and late merchants at York"—"and of the Parliament upon the publique faith, lent att sundree times."

He was evidently a clothier, and in an extensive way of business, as may be gathered from the following extract from his will. After giving in trust to his brother-in-law, Richard Bentley, and James Robinson, of Bowood, and their heirs, his freehold lands in Norland, with the buildings upon them, he continues:—

Yett my will and minde is, that Josias Stansfeld my son, would buy it of them, before any others; if soe hee bee willing to give as much for itt as another will. And what part of the money the said ande is sould for, with what part of my debts, also, that can be rec^d or recovered and gott in, which shall remayne when my debts is fully paid, I give the same, with all my goods and chattells, wholly to my son, Joshua Stansfeld, his executors, administrators, or assigns.

Butt if it should fall out, that not soe much as the debts owing to me, with the money the landes be sould for, will not extend to paye the debts I owe, then my will and desire is, that my son Josias Stansfeld, would bee pleased to allow the whole yearly profitts of those two fulling Millnes and their landes, letten to the Millner, now lying on the west side of the Brooke, with one houlme called Millne houlme, wh: I enjoy, whilst I live here, may be taken up and employed, for the payment of the residue of my debts, until the same be fully discharged. And also, until the yearly profitts of the said landes and milnes have made up the sum of £40 more, towards the help and prefermt. of my son Joshua, his brother, to be paid to him, when he cometh to have ended his apprenticeship with Mr. Leaver [?] att London. And I desire my son, Josias, also to take order, whether he himself live or not, that other £40 may be payde to Joshua, my son above said, at the end of five years, next after the end of Joshua his apprenticeship.

Also, I do hereby appoint and make Josias Stansfeld, my son, sole executor of this my last Will and Testament; but if he refuse to undertake the said offer, then do I hereby make his brother Joshua, my sole executor of this my last will; hoping, notwithstanding, that my son Josias will undertake to do his endeavour, to see this my last will performed. In witness whereof I hereby set my hand and seal, the day above said. These being witnesses, Richard Bentley and Josias Stansfeld.

The explanation of this peculiar reference to the elder son, Josias, is that, previously to the date of his will, viz., in 1647, James Stansfeld, of Sowerby Dean, surrendered a messuage and lands, &c., and a fulling miln and milneholm, to the use of Josias Stansfeld his son and heir apparent. He himself obtained possession of the mill, then in tenure of

Thomas Stansfeld, of Sowerby Dean, evidently upon the death of his uncle Lawrence.

The Richard Bentley, named in the will of James Stansfeld, as his brother-in-law, was the father of Timothy, Eli, and Daniel Bentley. Eli Bentley was the Puritan minister occupying the Vicarage of Halifax, when Vicar Marsh, Dean of York, returned to his own again. Daniel Bentley was the curate of Sowerby Bridge, and was buried 2nd March, 1659-60. Oliver Heywood, in his account of the Independents of Sowerby, mentions both their parents.

Joshua, second son of James Stansfeld, commanded a company of militia in 1642, under Sir Thomas Fairfax, at the battle of Adwalton Moor, who was routed there by the Royalist commander, the Earl of Newcastle.

Josias Stansfeld, son and heir of James, was born in 1619, and died in 1702-3, being buried at Sowerby, on the 23rd March. He married Martha Swayne, of Little Horton, in the parish of Bradford. Both he and his wife were members of the Independent congregation formed by Mr. Root; and upon his death they joined Oliver Heywood's Presbyterian body on the 18th June, 1672. Their house at Breck was useful to Heywood when he visited Sowerby to preach, and several references occur in his diaries, as follow:—

1671. On munday we came to Manch[ester], on tuesday to Ratchdale, preacht at Elizab. Haslams, on wednesday night, at Josiah Stansfelds, in Sowerby, on thursday octob. 12 I came home.

1672. On friday may 31, we had a private day at Josiah Stansfield's house, where also I preacht—it was a good day blessed be god.

1702. Mar. 23rd. Old Josia Stansfield of the Breck in Sowerby, bur. at Sowerby.

Richard Brooksbank, of Shelf, yeoman, who made his will 4th February, 1662, mentioned that he had given, 25th August, 22 Chas. [1646], all his lands in Shelf to his brother-in-law, Samuel Swaine, late of Horton, and Josias Stansfeld, of Sowerby, to the uses of his will. His son, Joshua Brooks-

bank, in his will dated 4th April, 1666, bequeathed to his uncle and aunt Stansfeld, £3 and a pair of boots, and to their children 20s. each. He also specially named his cozens, Timothy and Joshua Stansfeld.

Josias Stansfeld had seven sons, all of whom married and had issue. It is from the eldest and youngest sons that the present known descendants of the name are derived.

An entry in Oliver Heywood's diary may also well be given here, recording an instance which does not often occur in the history of any family :—

1679. May 19. munday I rode to Joshua Stansfelds of little Horton, where Mr. Sharp and I, and many others, kept a day of thanksgiving, for the deliverance in child bearing, of 5 brothers wives, viz. : Timothys, Joshuas, Samuels, Jamess, Josiahs Stansfelds wives in childbed.

Joshua Stansfeld, of Horton, second son of Josias, of Breck, was, like his father, a Nonconformist, and a member of the Rev. Oliver Heywood's congregation. He married, in 1672, Martha, the daughter of John Sharp, of Horton, the noted Parliamentarian, and secretary to Fairfax during the Western Campaign of the Civil Wars. Martha Sharp was, consequently, sister to Abraham Sharp, the astronomer, who often refers to the Stansfelds in his correspondence.

The following is extracted from the settlement in respect to the contemplated marriage of Joshua Stansfeld and Martha Sharp, viz. :—

Inden. bn. Josias Stansfeld of Sowerby and Joshua Stansfeld, his son. Whereas a marriage is intended to be solemnised betⁿ. Joshua Stansfeld and Martha Sharp, daughter of John Sharp, late of Little Horton, dec^d. in consid. thereof the said Josias S. doth grant to Thomas Sharp, Clerk, bro. of Martha, and Jonas Waterhouse, of Bd^d. Clerk, one annuity of twenty marks out of his estates in Horton and Bowling, to the use of the said Joshua Stansfeld on his marriage with Martha Sharp, &c.

JOSIAS STANSFELD,
JOSHUA STANSFELD.

Witnessed by—ISAAC SHARPE,
JOHN LISTER,
ABRAHAM SHARPE.

Martha died in childbirth within two years of her marriage, and the sad event is referred to by Heywood in his diary thus—

1674. These two days viz. munday and thuesday June 22 and 23, 1674 I haue been at two as solemne funerals, as ever I was in all my life. * * * * the latter Joshua Stansfield's wife, who dyed in childbirth June 21 and the child with her, whom I saw laid in one coffin, the child in her arms, as tho it were asleep, an affecting sight, sad for relations, Lord sanctify it to all.

Joshua Stansfeld married in 1677 for his second wife Judith Wood, of Hipperholme. Taking into consideration the melancholy end of his first wife, the following entry of Heywood's attains its due significance :—

15th November 1678. friday, I rode to little Horton, there Mr. Sharp, George Ward, Joseph Lister and [I] prayed, many others joyned, at Joshuah Stansfield's, for his wife near her time, oh w^t a heart melting day was it, as to publick, private.

The following extracts from the same source are also quoted :—

1690 Oct. 26. Joshua Stansfield's wife of Little Horton, buried.

1692 Sep. 9. Baptised. Josiah, son of Joshua Stansfield, of Horton.

1704 Sep. 14. Married. John Stansfeld of Little Horton and Eliz. Battersby.

1705 Aug. 24. Elizabeth, wife of John Stansfield of Horton, died of the first child.

1713 Feb. 18. Josiah S. of Joshua Stansfeld, of Horton buried, aged about 20.

1714 May 6. Married. Edward Hanson of Wyke and Martha Stansfeld of Horton.

1724 Dec. 16. Joshua Stansfeld of Horton buried his wife.

1725-6 Jany. 13. Married. Sam^l Stansfield of Horton and Lydia, d. of Mr. Sandford, Minister at Pontefract.

1733-4 Feb. 14. Joshua Stansfield of Little Horton, aged about 86 years.

1738 Oct. 21. Samuel Stansfeld of Horton, died 21 Oct.

It seems very probable from the above that there were

two Joshua Stansfelds living at the same time, one of Horton and another of Little Horton, and that the former was brother to John and Samuel Stansfeld, and son of the other Joshua Stansfeld of Little Horton.

Joshua Stansfeld, the son of Joshua, senior, was a stuffmaker at Holme Top, and carried on his business there. He was also a property owner, as the following indenture testifies:—

Whereas Joshua Stansfield in and by his Deed or Indenture bearing date the 10th day of January, 17—, in consideration of the summ of two hundred pounds of lawful money of Great Britain to him in hand paid by Faith Sawrey, widow, granted, bargained, sold, released, and confirmed to the said ffaith Sawrey, her heirs and assigns, All that messuage dwelling-house or tenement wherein the said Joshua Stansfield and John Smith do severally inhabit and dwell, called the Holme Top, with one barn, one stable, and other outbuildings, one garden thereto belonging, and two cottages or dwelling-houses appertaining to the said messuage wherein William Laycock, John Moulson, and Henry Blackburn do now severally inhabit, with the appurtenances in Horton aforesaid; and also all those several closes of land to the said messuage belonging, with their appurtenances, situate, lying, and being in Horton aforesaid, called by the name or names of the Croft; two closes adjoining to the said messuage, the two South Fields, the Ing, the close lying at the bottom of the Ing, and two other closes lying near Bowling Beck, and the tithes of hay and grass yearly growing thereupon: Redeemable nevertheless on payment of the sum of two hundred and eight pounds of lawful money by the said Joshua Stansfield, his heirs, executors, or administrators, unto the said ffaith Sawrey, her executors, administrators, or assigns, at the days and times and in such manner and form as in the said Indenture for that purpose is mentioned and expressed: And whereas the said Joshua Stansfield hath, the day of the date of these presents borrowed, had and received of the said ffaith Sawrey the further summ of one hundred and fifty-two pounds of lawful money, and hath agreed hereby to charge the said mortgaged premises therewith, together with interest for the same after the rate of four pounds for one hundred pounds for a year. The condition therefore of this obligation is, &c.

Joshua Stansfeld and Joseph Stansfeld, father and son, both clothiers, held the lease of Holme Top Farm from Faith Sharp, including the messuage with barn and buildings thereto belonging, two closes of land adjoining and known as the Far Croft, two other closes known as the Upper and Lower Parrock, in Little Horton, and all those five closes in Great

Horton known as the two Southfields and the three Goose-lands, at the yearly rental of £12 4s.

Samuel Stansfield, the third son of Josias, married, 12th April, 1675, Mary Clarkson, of Bradford. She was one of the five brothers' wives in childbirth, at the same time, for whom Oliver Heywood and others kept a day of thanksgiving, 19th May, 1679. Heywood also records in his diary a visit to her husband's house :—

"1678 September 24. Tuesday morning, I rode to Bradford, kept a private fast at Sam. Stanfield's, oh what a heart melting day was it, w'n Jo. Lister exercised, and myself, my heart was drawn out."

A letter from Ralph Thoresby, the historian of Leeds, to John Evelyn, F.R.S., whose mother was a Stansfeld of Lewes, refers to Samuel Stansfield, who is said to have been the first to spell the surname in the manner it is here represented.

"Honoured Sir. You obliged me with a letter at Christmas, which I gave you the trouble of an imperfect reply to, for tho' I sent to Mr. Samuel Stansfeld of Bradford (the eldest living of that name) to know whether they could prove their descent from the Stansfelds of Stansfeld, a good family and ancient, in this West Riding of Yorkshire, he never vouchsafed me an answer till the other day, and now he writes that tradition says they are descended from them, and as a confirmation, in several of their ancient houses, are painted the arms I enquired after, viz., sable, 3 goats rampant (I presume he means trippant), argent. His father, Josias, died anno 1703, in the 83rd year of his age, leaving 7 sons, one of whom is Vicar of Newark-upon-Trent, the rest tradesmen of competent estates. It may perhaps be a pleasure to your friends (and then it will be a great satisfaction to me), to send you a pedigree of that ancient family, as I have it in a manuscript of the gentry of these parts. You will please, Sir, to pardon this repeated trouble from,

Sir, your most obliged humble Servant,

Leedes 6th April 1706.

RALPH THORESBY.

Samuel Stansfield belonged to a class of tradesmen who carried on the business of drysalter, and were generally well-to-do. His residence and place of business was in Kirkgate, upon the site of which Beckett's Bank has been erected.

His only son was Robert Stansfield, who was associated with his father in his business. Samuel Stansfield died in 1727, and is interred in Bradford Church, where there is a monument to his memory.

His son Robert, born in 1676, married in August, 1703, Elizabeth, the daughter of the Rev. Thomas Sharp, M.A., of Horton Hall, and elder brother of Abraham Sharp. The indenture of the marriage settlement is as follows:—

August 20th, 1703.

Indenture between Samuel Stansfield, of Bradford, salter, Abraham Sharp, of Horton, gentleman, Joshua Stansfield, of Bradford, yeoman, and Robert Stansfield, of Bradford, only son of the aforesaid Samuel Stansfield. Whereas a marriage is intended to be solemnized between the said Robert Stansfield and Elizabeth Sharp, only daughter of Faith Sharp, widow, in consideration of which the latter had settled a considerable estate upon her daughter, the said Samuel Stansfield, in consideration of the said marriage, doth grant to Joshua Stansfield and Abraham Sharp, to the use of his said son and his intended spouse, all that new erected messuage situate in Kirkgate, Bradford, wherein the said Samuel Stansfield doth now dwell, together with all, &c., belonging thereto, all which premises were lately bought by Samuel Stansfield of one Thomas Taylor, of Pontefract, as well as those closes of land known as the Croft, the Croft Head, the Hall Close, the Delfe Close, the Foster Close, the Butts, and the Penny Oaks, in Bradford aforesaid; also one half part in his household goods and goods used in his business of salter, to which Robert Stansfield entered as partner.

By his first wife Robert Stansfield had several children, but only one survived infancy, viz., Faith, married in 1722 to Mr. Richard Gilpin Sawrey, of Broughton Tower, Lancashire. She was the legatee of her great-uncle, Abraham Sharp, and succeeded to the Sharp property. Mrs. Sawrey survived her husband, but died in 1767 without issue.

Robert Stansfield's second wife was Anna, eldest daughter of William Busfeild, of Ryshworth Hall, near Bingley. She was born 20th June, 1697, married 3rd September, 1723, and died 1st December, 1757, aged sixty. They had issue: Robert, son and heir, and several other children.

Robert Stansfield's will was dated September 8, 1744, and he died shortly afterwards. By his will he devised all his estates in Bradford and Horton, late the estate of Thomas Swaine, late of Bradford, surgeon, and Thomas Swaine, clerk, his son; also his lands at Baildon, Idle, Tong, Gargrave, Long Preston, Grassington, &c., to his eldest son Robert, and his heirs, remainder to his second son William, and his heirs, remainder to his third son Thomas, and his heirs, &c., with remainder to Faith Sawrey and Ann Stansfield, testator's daughters, &c.-

Robert Stansfield, son and heir of Robert, was baptised at Bradford, 24th January, 1727, and died 14th September, 1772, aged forty-four years. He married his cousin, Jane, daughter and co-heiress of Richardson Ferrand, of Harden, by Anna, younger daughter of William Busfield, of Ryshworth Hall, Bingley; and had no issue. He purchased Esholt Hall from Sir Walter Blackett, second baronet, in 1755.

On the west side of the transept of Guiseley Church is a marble monument, containing arms and inscription as follows:—

ARMS:—Vert, three goats trippant, argent, armed and unguled, or (Stansfield); surmounted by an escutcheon of pretence, bearing: Argent, on a chief, gules, two cross crosslets of the first (Ferrand).

CREST:—A lion's head erased, or.

Sacred to the memory of Robert Stansfield of Esholt Esq^r. He married Jane, eldest daughter & co-heir of Richardson Ferrand of Harden Esq^r & by her had two daughters, who died in their infancy: He departed this life Sep^r 14th 1772, aged 44 years. He was of a friendly generous & affectionate disposition, esteemed by his acquaintance, beloved by his relations, & was truly deserving the character of a worthy gentleman. Also to the memory of Elizabeth, second daughter of William Rookes Esq^r by Ann his wife, the only surviving sister & heir at law of the above Robert Stansfield Esq^r. She died 5th of May 1780, aged 15 years. Also to the memory of Jane Stansfield, relict of the above R: Stansfield Esq^r died June 18th 1796 aged 65. Her conduct as a wife was irreproachable, and her widowhood of 24 years was spent in unaffected piety and universal benevolence to all around her, particularly to the afflicted and distressed, to whom she was a constant benefactress. She lived beloved, and died lamented.

In the year 1755, an Act for the sale of the several estates left by Robert Stansfield, deceased, for the purpose of the purchase of the Esholt Hall estate by his son, was obtained. The rental of the Esholt estate, bought of Sir Walter Blackett by Mr. Stansfield, was £1348.

Annie Stansfield, only surviving sister and heiress of Robert Stansfield of Esholt, was born 27th August, 1729, and died at Esholt, 12th February, 1798, aged sixty-eight. She married at Otley, 8th September, 1758, William Rookes, of Royds Hall, Senior Bencher of Gray's Inn, who was born 27th August, 1719, and died 24th Oct., 1789. They had no surviving male issue, and their daughter, Anna Maria Rookes, married, in 1786, Joshua Crompton, of York. These latter had issue: William Rookes Crompton, who assumed the additional surname and arms of Stansfield in 1832, in compliance with the testamentary injunction of his mother. He married Emma, eldest daughter of William Markham, of Becca Hall, County York, and granddaughter of Archbishop Markham, but had no issue. His nephew, General William Henry Crompton Stansfield, deceased, was the last owner of Esholt Hall and estates.

Esholt Hall, between Leeds and Bradford, formerly the seat of Mr. Joshua Crompton, contains within its grounds the Nunnery of Esholt, founded by Simon de Ward, in the middle of the twelfth century, and dedicated by him to God, St. Mary, and St. Leonard. Several other benefactors also contributed various lands in the adjoining manors of Yeadon and Idle, an ample endowment for six nuns. This priory, at the dissolution, remained in the Crown for nine years, to 1547, the first Edward VI., when it was granted to Henry Thompson, gentleman, one of the King's gendarmes at Boulogne. In this family Esholt continued somewhat more than a century, when it was transferred to the neighbouring and more distinguished house of Calverley by marriage. Sir Walter Calverley, Bart., built on the site, in the earlier part

of the last century, the present mansion. It is not improbable that, till the general demolition of the building by Sir Walter Calverley, much of the Priory continued in its original state ; but now a few pointed arches in some of the offices alone remain to attest that a religious house once occupied the site. Where the Priory Church stood, there remains also an inscription in very singular hieroglyphical characters of Elizabeth Pudsey, Prioress, with the armorial bearing of the Wards, founders of the Priory.

There was a large correspondence carried on between Mrs. Sawrey, at Horton, and the Stansfields of Esholt, but nothing of interest is elicited thereby. The following are samples of the letters written to Mrs. Sawrey by Mrs. Jane Stansfield, who, it may be stated, wrote a beautiful hand, and whose orthography was also excellent :—

To Mrs. SAWREY at Horton.

ESHOLT, *December 22nd, 1762.*

DEAR MADAM,

I am very grateful for your kind favour, and we are pleased to hear you are tolerably well. I hope you will pass this winter better than you did the last, but we have vastly cold, uncomfortable weather, which does not agree with many people. I spent a very agreeable fortnight in York with my old friend Mrs. Rockett. She seems exceeding happy fixed with a very worthy man in a neat, comfortable house, and they live very prettily, with great happiness to themselves and satisfaction to their friends. My sister Bell met me there, which added much to the pleasure of my visit. I cannot say my health is much better either for the journey or for Doctor Dealtry's prescription, which I have followed some time ; but I live in hopes of going to Harrogate early in the season, as the Doctor has advised it, for he thinks my complaint is partly scorbutick, as well as nervous. Mr. Stansfield keeps well, and we are much obliged for your good wishes to us. We beg your acceptance of a spare rib chine and a dish of black puddings. I hope they will prove tolerably good. Mr. Stansfield joins me in all kind respects to you and Miss Gilpin.

I am, Madam,

Your affectionate and humble servant,

JANE STANSFIELD.

ESHOLT, October 11th, 1765.

DEAR MADAM,

I received your favour while at Ryshworth, or would have acknowledged it sooner. I hope you will now accept of my best thanks for it, and you may depend upon it all your letters relating to a certain person are destroyed. We confess honestly to you we could not judge by your manner of writing that you had the least intention of purchasing the house, for I have just perused the letter before I burnt it, wherein you say you could have liked to have bought it, but, having no money, you could not think of it, so we never imagined you had a further thought about it. Mr. Stansfield had £2100 bid for it when he sold it to my late brother, and he laid out at least £300 more upon it, that Mr. Stansfield looks upon it worth a good deal more money than when he first sold it. I don't know how people may represent the letting of the house by its being pulled to pieces. There is no such thing. Mr. Stansfield has let it for seven years. The tenant is bound under conditions to keep all in excellent repair, and is to pay us £60 per year clear of all taxes, which will stand him to near £10 year more. Mr. Stansfield has to lay out about £12 in putting a rough plaster on a room or two unfinished, and has to enlarge the gateway so that a wagon loaded with wool may drive through with safety, which at present it could not. This alteration is to be made, and is thought will come to the above sum of £12.

We conclude he will let off as much as can conveniently spare, in order to reduce his own rent, but we could not, I think, reasonably object to his doing so.

We were glad the fruit and partridges were acceptable to you, and wish we could have sent you more, but the peaches are now quite over, and we have had less this year than any year since we came to Esholt. My brother and sister Rookes desire to join in all kind respects to you and our compliments to Miss Gilpin. Please to excuse the sad scrawl, and believe me,

Dear Madam,

Your affectionate and humble servant,

JANE STANSFIELD.

CHAPTER XIII.

THE ROOKES FAMILY.

The ancient family of Rookes—Of Rookes and Royds Hall—Pedigree of the Family—Notes on the Royds Hall Family—Notes on the Rookes Estate.

The family of Rookes of Rookes and Royds Hall, in Hipperholme and North Bierley respectively, are but remotely connected with the subject of this volume, namely, through the marriage of William Rookes, Benchet of Gray's Inn, with the daughter of Robert Stansfield, who married Elizabeth Sharp. A brief reference to the family therefore must suffice.

William Rookes was the last of a family residing at Royds Hall as far back as the 15th century. The family were, however, first located at a place still called Rookes, near to Norwood Green, in Hipperholme. From documentary evidences it would appear that some time in the reign of Henry VII. they had become Lords of the Manor of Royds in North Bierley, which towards the close of last century became vested in the Low Moor Ironworks Company. About the year 1640, a William Rookes, who married the daughter of Richard Wilkinson, of Bradford, erected the

manor house called Royds Hall, probably upon the site of a former dwelling belonging to his family, which is now the residence of Mr. Laurence Hardy, a proprietor of the Low Moor Ironworks. It is a good example of the houses of the gentry of the period of its erection.

The pedigree of the family of Rookes of Rookes and Royds Hall commences about 1450, but there is much earlier mention of the names of Rokes, Rookes, Rokis, Rokys, Rokkys. The arms of the family were—Azure, a fess argent between three chess rooks or. The family pedigree was compiled by Mr. J. H. Turner for the *Bradford Antiquary*, to accompany a paper entitled "Early Notices of the Rookes Family." To that paper readers interested in the ancient family of Rookes may be referred.

The following notes on the family are from the Harleian records, the Watson collection, the Walker MSS., and other sources, and have been obtained through the kindness of Mr. John Stansfeld, of Leeds, to whom those valuable MSS. now belong. The notes are arranged chronologically, and without reference to the source whence they came, viz.:—

1315—Ric del Rokes, with Thomas de Rooks, occur in a deed signed by Robert Waterhouse.

1362—John del Rokes.

1390—John de Rokes occurs as a witness, dated at Hipperholme, the Feast of All Saints.

1397—John de Rokes occurs as a witness in a deed.

1403—Johannes de Roke.

1473—In a deed 24th January, 13th Edward IV., Thomas Wylkynson, Vicar of Halifax, and Richard Rookes, of Rodeshall, appoint Thomas Smythies their attorney to enter into all lands they have in Shelf, Bradford Dale, Haworth, &c., and take seisin of all which William Hopton, armiger, John Nevill, John Sotehill, jun., Amer Burdleade, — Percival, armiger, Thomas Lacy, Edward Longbottom, and William Rokes gave them by a late deed.

1506—John Rookes de Rookes occurs in a deed.

1532—Richard Rookes de Rodeshall occurs in a deed.

- 1534—Will of Richard Rokes of Rodshaull, dated 11th February, 1534; proved 24th September, 1535. Soul to Almighty God and his body to be buried in the Parish Church of St. Peter and St. Paul, Bradford Appoints his son William Rookes his successor and residuary legatee.
- 1537—William Rookes of Rodeshall, occurs in a deed.
- 1551—Will of William Rokes of the Rodeshall, dated 14th August, 1551; proved 25th September, 1551. Soul to Almighty God and his body to be buried in the Parish Church of Bradford. All his lands called Reyvey, now in the holdinge of the Bisshope of Sainte David, and the half parts of all my great pasture called Buttershawe to descend to son and heir William Rokes. To younger son Richard lands in Wibsey and the moore and waste grounde of the west parte of Wibsey Farme (except the free rents). Remainder to William Rokes and his heirs. To his wife Johanna the demaynes of the Rodeshall till his sons William and Richard be 18, then to have half for life.

Notes concerning the estate of Rookes, in Hipperholme.

The estate of Rookes consisted before it was divided — some time about 1691 — of a messuage called Nether Rookes and two other messuages, described as “three messuages called Nether Rookes, three barns, 30 acres of land, 30 acres of meadow, 40 acres of pasture, and 8 acres of wood in Hipperholme.”

OWNERS OF ROOKES.

- 1555—Richard Brighthouse, sen., yeoman, who conveyed the estate to his two sons, in moieties.
- 1561—Martin and Jasper Brighthouse, of whom Martin sold his moiety, and Jasper afterwards his, to
- 1568—Gilbert Saltonstall, of Lightcliffe, clothier, who was succeeded by his son, Samuel Saltonstall, of Rookes and Huntwick, who married Ann, daughter of John Ramsden, of Longley, Esq., who was succeeded by his son, Sir Richard Saltonstall, Kt., of Huntwick, who married Grace, daughter of Robert Kay, of Woodsome Hall. After his wife's death, Sir Richard went with his children into New England, having sold Rookes to
- 1627—John Whitley, of Sowood House, Hipperholme, yeoman, whose son was

- 1691—Nathan Whitley, of Rookes, yeoman, who by his will left one moiety of the estate to his daughter, Elizabeth Stanhope, wife of Samuel Stanhope, of Tong, Esq., and to Samuel Riddlesden, his (N. W's) grandson, whose father had married another daughter.
- 1715—Samuel Stanhope and Elizabeth, his wife, sold their moiety of Rookes to Gervas Browne, of Tong, gentleman, who by his will demised the same to the Rev. Robert Tempest, clerk, of Sheffield, who by his will devised the same to his sister,
- 1771—Elizabeth Tempest, of Nottingham, widow of John Tempest. She sold to William Sutcliffe, of Hipperholme, merchant, who sold to
- 1779—Thomas Fourness, of Otley, gentleman, for the sum of £1500, who by will (1782) devised the estate to his grandson,
- 1782—Matthew Wilson, of Eshton, whose father had married a daughter of the said Thomas Fourness.

As to Riddlesden's moiety.

- 1721—Samuel Riddlesden, mentioned above, grandson of Nathan Whitley, of Rookes, by his will devised his moiety of Rookes to his two daughters and a child unborn: Mary, Elizabeth, who married John Walker, of Boyfall, Kirkheaton, who sold her share to
- 1759—Richard Riddlesden—apparently the posthumous son of the above Samuel Riddlesden—who by his will (1779) devised the estate to his eldest son, Samuel Riddlesden, of Ashbourne, surgeon, who was succeeded by his eldest brother and heir, Richard Riddlesden, of Dove Leys, County Stafford, Esq., whose son was John Beech Riddlesden, described in 1809 as a cornet in the Horse Guards, who sold his estate to
- 1814—James North, of Wibsey, maltster, who was adjudged bankrupt, and the estate was then put up for sale by auction in 1827.

The property descended from a member of the Whitley family (who had recovered it) to the Tolsons, of Huddersfield, in whose family it still remains.

CHAPTER XIV.

DR. NETTLETON.

Dr. Thomas Nettleton, a native of Dewsbury—Practised medicine at Halifax—Dr. Wm. Whitaker, of London—Dr. Wm. Sawrey, of Newcastle-on-Tyne—Correspondence in reference to inoculation for the small-pox.

The manuscript correspondence of Abraham Sharp covers a variety of subjects, few of which can be alluded to in this volume. Among letters extant there are several written to Dr. William Sawrey, of Newcastle, a gentleman of repute in his profession, and a relative of Mr. Richard Gilpin Sawrey, who married Faith, the daughter of Robert Stansfield and Elizabeth Sharp. They are interesting as treating of a period when inoculation was introduced into England as a preventive or a palliative of the terrible scourge of small-pox. Since, however, the introduction of vaccination by Dr. Jenner, the practice of inoculation has been deservedly abandoned.

Among the most successful operators of the system of inoculation was Dr. Thomas Nettleton, of Halifax, and Dr. Whitaker, of London, also took great interest in the movement. Dr. Thomas Nettleton was a native of Dewsbury,

studied physic at Leyden, and practised for many years at Halifax. He contributed to the "Transactions of the Royal Society" in 1722 two papers on inoculation of the small-pox. It appears that Dr. Nettleton himself inoculated sixty-one persons, the total number inoculated throughout England being only 121. The doctor married (in 1708) Elizabeth Cotton, of Haigh Hall, by whom he had several children. He died January 9, 1741-2, at Halifax. Both the above gentlemen were in friendly communication with Dr. Sawrey on the subject, as will appear by the following letters:—

LONDON, June 25, 1723.

DEAR DR.,

Yours I received, and am very glad to find you are still in being. I am very much surprised that neither mine nor Pye's letters ever came to your hand, but, however, we all of us of your acquaintance rejoice to hear you are alive. Fry has just this moment arrived from Antigua, and has thrown off our profession to deal in the commodities of the island. Happy change! for he had but one patient all the while he was there. Stephens has sent me over a large catalogue of plants to be got for him here; he is made Professor-General of all His Majesty's botany gardens in Dublin and the kingdom of Ireland.

As for the state of physic in this town, it is, I believe, pretty much the same that it was when you was here. The college have done nothing but given us a new addition of their dispensatory, and with how many amendments I leave you to judge. The dons of the trade go on invariably in their old method of taking fees and doing nothing, unless fevers will submit to testaceous powders and blisters. To do anything different from these gentlemen is malapraxis, and the apothecary will stick up your bill by itself as a monster—pray walk in and see the show!

There have two new things been started here, both, I believe, capable of being made beneficial to mankind, but have each of them met with very great opposition—I mean inoculation and the higher operation of cutting for the stone. I suppose you have seen the several pamphlets written *pro* and *con* in the affair of inoculation. I should be glad to know your opinions of this method, and whether you have had anything done your way. There has near sixty been inoculated here this spring and summer, and I do not hear certainly of any miscarrying. I went about a year ago to Chichester, where I inoculated some, and, from what I was able to observe, nothing can be more just than the description Nettleton has given of this sort of small-pox. Dr. Jurin has lately written an account of the comparative mortality of the inoculated small-pox and the natural

sort, which, if you have not seen, I believe you would be well pleased with.

As for the higher operation of cutting for the stone, Mr. Cheselden has a treatise coming out upon it. He has cut with the most success of any in St. Thomas's Hospital. There were several of us attended last winter a course of pharmacy given by Dr. Quincey, but it did not answer our expectations. However, the lectures are printed, if you have mind to see them. You see I have given you some little account of matters in our own way, in order to lay a foundation for a physical correspondence. All your friends here desire to be remembered to you.

I am, Sir, yours,

WM. WHITAKER.

Inscription on back of Letter.

"To

DR. WILLIAM SAWREY,

At Mr. Anderson's, Merct.,

In Newcastle-upon-Tyne."

HALIFAX, *October 23rd, 1723.*

SIR,

I was favoured with yours of the 8th inst. Since I received it I have been almost constantly abroad, otherwise I would have answered it sooner, and if it will be of any use, shall be very ready to communicate to you any observations I have made concerning inoculation, which practice I have happened to be engaged in. I had long been possessed with an opinion that it would be very serviceable, by the account which I had met with from Turkey in the *Philosophical Transactions*, but I durst not venture to practice that method till I heard it had been done with success at London by Mr. Maitland, who was the first that introduced it into England, and therefore ought, in justice, to have the honour of it, if it shall be found to deserve any. After a considerable number had been inoculated here, Dr. Whitaker, hearing of it, wrote to desire some account of what I had done, which I accordingly sent up to him, and it being shown to some of the most eminent physicians in London, the Royal Society were pleased to take notice of it, and to print that and some other papers relating to the same subject in the *Transactions*, Nos. 370 and 374. There you will find the substance of what I have to say upon this matter, and also some other things written by much abler hands.

I have not since seen cause to alter my opinion concerning it, but only that I might possibly at first use some expression that might betray too much confidence. We know nothing in this world so perfect as not

to be subject to some inconvenience and misfortune, and to suppose that this method should never fail of success would be too great a presumption considering that it is exposed to so many accidents no human care can either foresee or prevent, and so many other causes may happen to join with the distemper given by inoculation as possibly to make it prove fatal in one instance out of one hundred. In the beginning of a practice we labour under a great many difficulties, and it is almost impossible to shun some few errors and mistakes which time and further experience may teach us how to avoid, but yet we have all the reason in the world to conclude from the experience we have had already that if this method was generally practised there would not the twentieth part so many die of small-pox as there does now, and ever will in the natural way.

I have never yet seen the confluent small-pox given by inoculation, but there was one here did die, though the pustules were distinct; this was the only one that miscarried under this method in this part of the kingdom, and we have reason to believe it was owing to some other cause, for we all concluded the child to be out of danger from the small-pox. She was very cheerful and brisk and the pustules were in a great measure gone, but she died suddenly in the night, without any notice of her being worse. This, as far as I can hear, is the only misfortune that has happened this year, though there have been great numbers inoculated, not only in London but in several other parts of the kingdom where the practice had been begun, with great success. I am very glad to hear that you have some thoughts of undertaking it, and I heartily wish you all possible success. It is a troublesome business by reason of the many enemies it meets with, not only amongst the superstitious of mankind but even amongst the gentlemen of the Faculty, many of whom are so ungenerous as to oppose it for reasons best known to themselves; but this is a matter of so great consequence to mankind, that I think every honest man ought to lend a helping hand to promote it. You may depend upon it that the distemper given by inoculation is really the small-pox, that it is attended with no other symptoms nor followed by no other consequences than what do appertain to the genuine and natural small-pox. We freely own that the operation may sometimes fail and produce no effect at all, but that it should produce any other distemper different from the small-pox or convey other distemper along with it, or that those who have had the small-pox by inoculation will ever have the distemper again in the natural way, these are suppositions without any manner of foundation in truth or nature, and altogether contrary to experience.

I am far from pretending to direct you as to the operation, your own prudence will best do that, but there are two cautions, which I believe we have not sufficiently observed, but, I am convinced, are very necessary, and the want of them may have caused those few miscarriages that have happened. One is, to be very careful in the choice of the subject we take the infection from, that they be of good constitution

and such as have a kindly sort of small-pox, the pustules round and plump, and not very numerous (either natural or ingrafted is all one), and let the matter be taken from the hands or feet, arms or legs, rather than from the face. I know very well some have affirmed that it is very safe to inoculate from any, even the confluent small-pox, but though I have not room to give my reasons for it, yet I would advise you never to take the infection from an ill or even an indifferent sort, but from the best and most kindly you can possibly meet with. The other caution respects the subject we make the engraftment upon, that we be careful to avoid such as are unhealthy or have any weakness or disorder upon them. To make choice of children rather than of persons that are grown up, specially young men that have been accustomed to live high. This caution is more necessary now than it may be hereafter, because in the beginning of a practice every single miscarriage puts a stop to it. I believe one incision may do as well as two, but only because the operation may fail in safety to make two or more as they do in Turkey. For preparation testaceous powders and gentle purging is best for children, and bleeding and vomiting for grown persons. I think it best to leave the incisions to themselves without endeavouring to heal them or keep them open.

I am, sir,
Your friend and servant,
THOS. NETTLETON.

Inscription on back of Letter:—

“For
Dr. WILLIAM SAWREY,
At Newcastle-upon-Tyne.
These.”

LONDON, Nov. 1, 1723.

DEAR DR.,

I had your letter a post or two ago, and am glad to find you have a good opinion of inoculation, for I can assure you I thought you had not from your own expressions in your letter, which was after you had exclaimed against Sir Richard's definition of a fever. You say, “He is against inoculation, too, for which I like him no worse.” 'Tis only from this that I gathered your sentiments in relation to this affair, and I am very glad I was mistaken. I find you have written to Dr. Nettleton, who, I am sure, would be very glad of giving you any satisfaction that lies in his power, and you may depend upon his veracity as to matters of facts. This gentleman has been very much abused by an advertisement in the *Post Boy and Evening Post*, which says he had been called

to a patient who he had inoculated, that was taken ill of the small-pox and died. This the Dr. saw in the papers, and has written to Dr. Jurin to desire him to see justice done him in this respect, for it is entirely false and groundless.

The chief arguments against inoculation here are reduced to very low principles, those of lying and false reports, which the anti-inoculatists are not at all sparing of. I find the objection that you cannot get over is that different constitutions may alter the sort, so that from a different kind a confluent one may be inoculated. This, I think, is the only real objection of any consequence against this practice. Dr. Nettleton, you say, assures you that he has not seen any confluent sort ever from inoculation, and I don't know of any here, but there has been one now at Salisbury that has died of the confluent kind from inoculation, but then she was of a very sickly constitution before, and known to be very subject to inflammatory disorders. There has now 120 been inoculated in that place, and this is the only one that has miscarried, though persons of all ages, and of the worst habits of body, and those who have lived very irregularly, have done well. I do not doubt but that an indifferent sort of small-pox, inoculated upon a bad constitution, may sometimes produce the confluent kind or some irregular sort of that distemper; but I cannot believe, if care was taken in choosing proper subjects (and I fancy none are improper that have not some invisible hereditary distemper or any other apparent disease), and a good sort of small-pox taken to ingraft from, but that this misfortune might be avoided, or rarely or never happen.

Dr. Nettleton has fallen into a new method of late, for instead of making incisions with a lancet he has taken a bit of epispastic plaster, and after that has raised the skin a little, rubbed in the variolous matter. I cannot think this so well as doing it by the lancet, for one does not know how far the salts of the cantharides may alter the matter of the small-pox, and then by this method you are deprived of all advantage from the discharge of the places of incision. The doctor is now convinced that this way is wrong, and in some measure ascribes the death of a child that he has inoculated to it. This is the only one this gentleman has lost. I have, inclosed, sent you that part of the letter you wrote for. If there is anything I can serve you in here I shall be glad to do it.

I am, Sir, yours truly,

WM. WHITAKER.

Inscription as before.

CHAPTER XV.

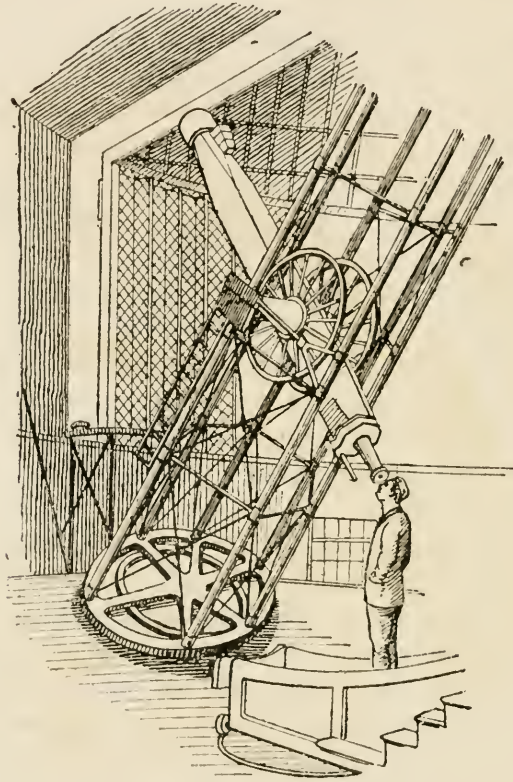
GREENWICH OBSERVATORY.

The original Observatory in which Flamsteed, Sharp, and Crosthwait worked is the father, not only of the Greenwich of to-day, but of all the great national observatories, and of the observatories of the second rank. The Observatory still stands on Greenwich Hill, but so expanded that little of the original is to be seen. Here the practical part of astronomical science is being carried on with diligence and method. Instead, however, of the humble sextant, micrometer, and two clocks which constituted Flamsteed's stock-in-trade, the instruments employed are much more varied and elaborate. Dr. Halley, who succeeded Flamsteed, found the Observatory empty, but the Government supplied him with funds to purchase the best obtainable at that period, and by their aid he amassed a heap of observations, which, however, were in so confused a state that no use was ever made of them. Bradley, who was appointed his successor in the year 1742, the year in which Abraham Sharp died, made a noble series of observations, extending over the twenty years in which he held office, and which form the basis of Besel's celebrated work, the "*Fundamenta Astronomiæ*." After the short career of Dr. Bliss, the office of Astronomer Royal was held for forty-four years by Dr. Maskelyne, who scarcely

ever left the Observatory except on some important scientific business. He also edited forty-nine volumes of the *Nautical Almanack*, an invaluable work for seamen. His successor, Mr. John Pond, who held office until 1835, entirely reorganised the instrumental equipment of the Observatory, and increased the staff of assistants. He was succeeded by the late Mr. G. B. Airey, formerly director of the Observatory at Cambridge. Under his presidency the Observatory was again reorganised, the staff augmented, and brought to a very efficient state ; old instruments being laid aside and new systems introduced, based upon the most recent achievements of mechanical science. The great work is now being carried on by the present Astronomer Royal, Mr. W. H. M. Christie, M.A., F.R.S., with an assiduity and ability worthy the high position he fills. Mr. Christie is aided by an able staff of assistants, of whom Mr. H. H. Turner, M.A., is chief, four first-class assistants and four second-class assistants. There are also numerous computers. A brief reference to some of the principal instruments in use in this national establishment may be made.

The refracting telescope, or Great Equatorial (of which a sketch is given, reprinted, by permission, from the *Pall Mall Gazette*), is fixed in a building with a movable dome in the south-eastern extremity of the Observatory buildings. It is the most powerful instrument the institution possesses, although it has long been considered a reproach that the institution should have been outstripped in its equipment by many foreign observatories. Its object-glass is 13 inches in diameter and 18 feet focus. It consists of a telescope turning upon an axis supported by a framework placed parallel to the earth's axis, or inclined to the horizon at an angle equal to the latitude of the Observatory. This framework turns freely upon pivots at each extremity, and from the circumstance that it always lies in the direction of the poles of the earth, it is called the *polar axis*. There is provided an

apparatus for turning the dome of the building, so that an aperture may always be kept before the object-glass of the telescope. Once fixed upon an object in the heavens, the instrument is driven by clockwork at such a rate as to keep

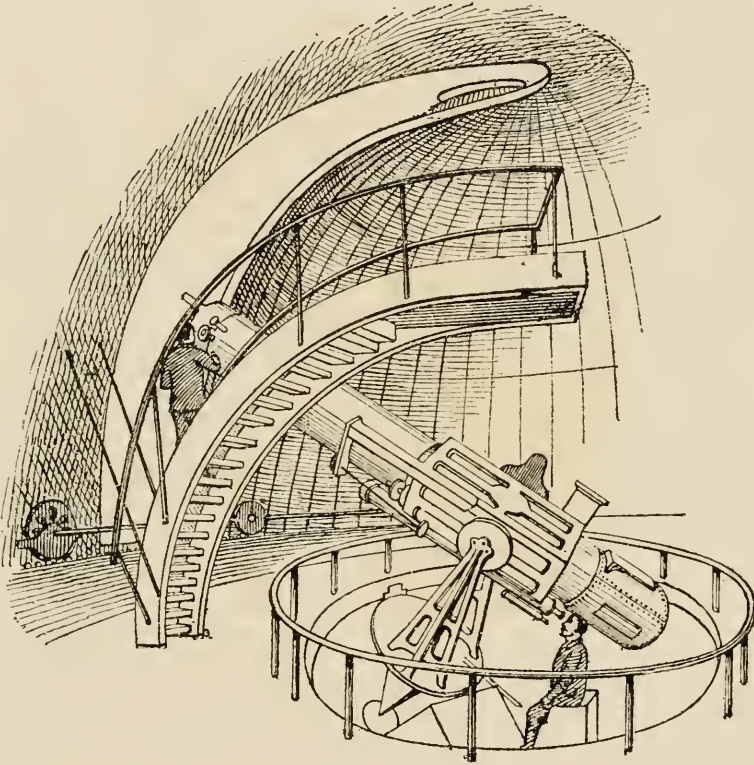


THE REFRACTING TELESCOPE, OR GREAT EQUATORIAL.

up with that object in its journey through the heavens, in other words, it is always "in the field."

Of this class of instrument Greenwich Observatory possesses three examples: one of about 4 feet focus, another of 8 feet, and the "Equatorial" shown in the drawing.

The other large telescope, of which a sketch is given from the above source, is known as the reflecting telescope, and has a large concave mirror of speculum metal at its lower end. Rays of light from a celestial object enter the open end and fall upon the mirror at the bottom. Thence they



THE REFLECTING TELESCOPE.

are reflected up the tube again and form an image of the object near the aperture. It also occupies a building having a movable roof or dome.

The most reliable description we have seen of the wonders

of Greenwich Observatory is contained in an account given by Mr. Chas. Stewart Murray, in the *British Almanac and Companion* for 1885. It is entitled "The Royal Observatory and its work," and from which the following extracts are taken :—

Passing through the gate of the Observatory, we enter the Great Transit-Circle Room. The telescopic part of the transit-circle is made in the following manner:—The tube consists of two hollow cones of cast-iron rivetted at their larger ends to a cubical centre-piece of the same metal. There is a horizontal axis, also of cast-iron, joined to corresponding sides of the central tube in a similar way; this axis is 6 feet long from pivot to pivot. The larger end of the tube holds the object-glass, which is about 8 inches in diameter, whilst the smaller end holds the eye-piece. The horizontal axis just mentioned terminates in pivots resting on "Y's," or shafting journals fixed upon piers, and supports the weight of the tube. The piers are of solid masonry, of adequate dimensions for the purpose, and rise from the foundations clear of everything likely to cause tremor in the instrument.

The inner sides of the massive stone piers form a pit into which the observer descends by a short flight of wooden steps. Here too may be seen centred upon the axes-pivots of the telescope two wheels. That upon the left hand or eastern side is used for clamping the instrument in position, whilst that upon the right hand or western side is the astronomical-circle. This circle has handles projecting obliquely from the rim much like the steering-wheel of a ship. Formerly there was the telescope by itself and the circle by itself, each working independently of the other. The telescope had for its companion the sidereal clock—which will be again spoken of—and the combined work of the two was to determine to the nearest fraction of time when any heavenly object passed the meridian, but there were no means of accurately indicating the point at which such object was seen. The instrument for this purpose was one called the mural circle, taking its name from what it was attached to, namely, *murus*, a wall. That at Greenwich is 6 feet in diameter. It is, when in use, mounted upon an axis that passes through a stone pier, having suitable bearings upon both sides of the pier; this axis lies true east and west, so that the circle shall turn in the plane of the meridian. It has a telescope fixed to it that moves with it, and there is a graduated band of silver upon the edge or line of this astronomical wheel, and six reading microscopes at equal distances upon the pier close to the periphery of the circle scale. By these means the divisions of degrees, minutes, and seconds of space can be easily seen. The telescope is a diameter of the circle, and can be clamped to it in any position that may be desirable. There are several modes of observing with the mural circle, one being by the reflection of stars in

a trough of mercury, which is placed conveniently for the purpose upon the floor near the stone pier already mentioned. It is the combination of this instrument with the great telescope that forms what is now known as the "Transit-Circle." The wheels are each 6 feet in diameter, the "real" one, as we have called it, having a circular silver band upon the western face finely divided into degrees, minutes, and seconds of distance, and another with coarser divisions upon the opposite face. To read this band there are ten reading microscopes, six of them being placed 60 degrees apart, which, as will be understood, command the 360 degrees of the circle. Each microscope is furnished with a micrometer, whilst the transit-micrometer carries the whole system of transit-wires. The micrometer heads are divided each into 100 parts. Other microscopes give the means of ascertaining the error of every 20 degrees of graduation, and of every 5 degrees. The eye-pieces of all these micrometer-microscopes are on the outside face of the right-hand stone pier, their line of sight being carried to the graduated band of the circle by small borings through the solid stone; the light is thrown upon the divisions of the band by a gas lamp on the inside face of the pier. There are two pointers in the pit by which to read the inside circular band. One of them is to indicate "North Polar Distance," and the other "Zenith Distance." There is a trough of quicksilver for the purpose of observing stars by reflection, the same stars being also observed directly, so as to give the zenith point, or the reading when the telescope points to the zenith. The zenith point is further determined by observing the coincidence of the horizontal or zenith distance wire, with its reflected image seen in the mercury when the telescope is pointed vertically downwards. A similar observation of the middle wire gives the error of level of the axis of the instruments with great accuracy.

As already stated, the two massive stone piers that support the transit-instruments enclose upon their insides a space that, being below the level of the room floor, forms a pit. Into this pit the observer descends, and by means of the steering-handles on the great circle—previously spoken of—he sets the telescope for the object that he is about to observe. If it is the sun, moon, or a plane—each of which has a visible disc—the centre of such disc upon the central wire is the actual transit, but a mean of the times of the entire passage is taken, as it is with the stars. With the chronograph the operation is much simplified, and much more correct. As the star, for instance, passes each wire, the observer instantly presses the chronograph key near the eye-piece, and the point of the latter instrument records the time to the smallest fraction of a second.

The chronograph is an odd-looking instrument when seen for the first time. There is a clock-train, with a conical pendulum driving a large cylinder revolving horizontally. This conical pendulum is fixed at the upper end to a universal joint, whilst the lower is attached to a projecting stem terminating in a blade revolving in a trough of glycerine, which has been found to be the most suitable fluid for the purpose, as

it does not produce rust. A frame moving upon endless screws, which are turned slowly by the clock, carries the recording mechanism. This "mechanism" consists of two electro-magnets, each of which can attract an armature, and produce action in two steel points. The cylinder is covered with paper, the object of which will be seen presently. Wires from the transit-clock connect it with one of the electro-magnets, just named, the consequence of which is that, at every beat of the pendulum, galvanic motion takes place, and one of the points makes a puncture on the paper immediately under it. From the other of the electro-magnets separate wires pass to the transit-circle, the altazimuth, and the great equatorial instruments.

A few words may now be said about the two great clocks of the Royal Observatory, namely, the sidereal and the mean time standard ones. They are both wonders of horological mechanism, and they have so many accessories of one kind and another that looking at them it is only the dials and the beats of the pendulum that convince you of their being clocks at all. In addition to the complex telegraphic provisions, there are arrangements of magnets and barometric mercurial columns in order to ensure, as far as is possible, absolute equality in the beats of the pendulums. The mean time standard is in electric sympathy with a number of clocks throughout the buildings, and it is the one that sends signals, drops time-balls, fires guns, &c., all over the country every day at 1 p.m. It is, in fact, the ruling timekeeper of our existence. Its domicile is in a stone closet under the time-ball turret, and it has for companions a clock by Graham, and another by Dent. A large window throws a good light upon its little dwelling. Its outdoor friend is the well-known "clock" in the Observatory wall by the entrance gate, about which many comical anecdotes have been told. This "clock" is, in reality, no clock at all; it consists of a bar magnet fixed horizontally upon a pin passing through its centre. The tick, tick, which we hear upon the outside is made by this bar as each end of it rises and falls by the electric action of the wire from the pendulum of the standard clock; as that clock beats so does its friend in the wall at the same instant. It has a 2-foot astronomical dial, the hours being numbered from I to O for the 24, the XII being at the bottom where the VI is of the ordinary clock. The comical side of this dial consists in the mistake that people make in setting their watches by it, through the hour and minute figures being in unusual positions. Hundreds of people have taken it for the mean time clock of the Observatory, little thinking that there are no "works" in the usual sense belonging to it; but it is much more correct than any one with "works," for its tick is, in fact, a prolongation of that of the mean time clock pendulum itself.

Our next inquiry is to ascertain how the mean time clock sends out its signals all over the land. Every morning the Time Department of the Observatory is busy in correcting clock errors, small as they always are; in fact, so small that none but astronomers would be able to detect that there were any errors at all. When all has been corrected the

pendulum of the normal clock performs its important functions, and by a system of electrical "relays" Greenwich time is instantly told to almost every village in the country. It travels east, west, north, and south, as the saying is, from the Land's End to John o' Groats. Now that the post office is the master of it commercially, it goes wider and further than it ever went before. But it must not be supposed that these morning 10 o'clock signals are the only ones. They are sent off as the normal clock completes every hour in the twenty-four; what is done in the morning is to ascertain and correct, as just stated, any clock error that may be found.

The arrangements of wires and magnets, and all the auxiliaries for the purposes of *making* time in the Observatory, are apparently complicated and undoubtedly most ingenious. The method of bringing the standard clock to mean time is interesting. One pole of a permanent bar-magnet about 6 inches long is carried by a pendulum rod 2 inches in front of it with the north pole downwards, and at each vibration passes closely over a fixed galvanic coil. This coil is in circuit with a battery, and is not in action in its ordinary state. On the Time Superintendent's desk is a small clock to direct him in dealing with the rate. The battery power is such that a current working for ten minutes on the bar of the clock pendulum will alter the time one second. Thus an error of a very minute fraction of even a second can be corrected upon this clock. Above the south pole of the magnetic bar on the mean time pendulum is a small bundle of soft iron wires bracketed to the case of the clock with sliding action; it has an alternate motion to or from the pole which alters the going rate of the clock without as much as touching the pendulum. The sidereal clock, too, drives what is called the sidereal relay. This relay registers the clock seconds on the chronograph, controls the half seconds of a pendulum clock near the hour circle of the great equatorial driving the 59-seconds clock, and working a sounder to render distinctly audible all over the dome the beats of the standard sidereal clock itself.

Let us now ascend and examine the Great Equatorial. Upon entering the room where this massive telescope is, the first view will be sure to arrest the surprised attention of the stranger. This instrument looks like a ponderous steam-engine in a state of rest, and it has so many subsidiary parts that it would require a lengthy paper to itself. The room is a circular one of about 30 feet in diameter, and almost the same height, the roof being a flat one, or nearly so. The instrument was constructed and erected from the designs of Sir G. B. Airy, the late Astronomer-Royal. The ironwork is by Messrs. Ransomes & Co., of Ipswich; Troughton & Simms, of London, having made and attached the observing mechanism. The large object-glass is nearly 13 inches aperture, the focal length of the instrument being 17 feet 10 inches. The glass was made by the celebrated firm of Merz & Sons, of Munich, and is a very fine one. The polar axis is formed of massive iron tubing, diagonally braced, and presents the appearance of great

strength and solidity ; at the floor end of the axis is a 24-hour wheel, six feet in diameter, having reading microscopes with micrometer-screws and other auxiliaries ; the instrument is driven by a beautifully constructed water-clock, supplied from a tank overhead. When the clock is in motion it runs so smoothly that it can scarcely be heard. The driving-clock mechanism is regulated by a modification of Siemens' chronometric governor and a conical pendulum. The observation-opening is through a shutter-window, and when the clock mechanism has set the telescope in motion, the observer can keep his seat moving on the floor-circle by means of a winch-handle and wheel-work ; the "dome" is turned in unison by another winch-handle whose wheel-teeth take into a large tooth-circle fixed to the wall of the dome. By the arrangement of the mechanism, the telescope and the observer can follow the motion of a heavenly body over the entire firmament. The equatorial may be said to be the sentinel of the sky, as it is continuously on the watch for whatever can be seen, comets, stars, planets, and so forth. It can be elevated and depressed, moved east and west, in fact, in any direction that the observer may desire. Furthermore, when he finds anything worthy of note, such as spots upon the sun, the rings of Saturn, and the belts of Jupiter, he has only to touch his contact-key, and the pricker belonging to him at the chronograph will register the minute and second of his observation. For general purposes the equatorial is the most powerful instrument that can be constructed for an Observatory.

The next instrument on our way is the Altazimuth. It is mounted in the highest practicable part of the building, so as to have an unobstructed horizon all round. There is a brick pier built up from the foundation level, which is surmounted by a short stone pillar, and upon this pillar the instrument stands. At first sight it suggests the cylinder of a nautical engine with the piston-rod removed. The azimuth circle is 3 feet in diameter, and the instrument is made from hard gun-metal ; it weighs nearly 4 cwt. It has also a vertical circle of the same size, and all requisite contrivances. The purpose of the altazimuth is to take observations of the moon daily from month to month in every part of her orbit, so as to improve the lunar theory. The mural circle and the transit telescope had been previously used ; but from the frequency of cloudy weather such observations could not always be made. By means of this instrument, however, observations can be regularly taken when the moon is off the meridian, and her meridional place computed to exactitude. All persons who are engaged in navigation are fully cognisant of the value of being acquainted with the method of "taking lunars" for longitude and distances. Descending from this room we visit the photo-heliograph, an instrument for obtaining pictures of the sun. The images are taken upon plates, the primary focus being only half-an-inch, whilst the subsequent enlargements upon the glass are 8 inches, or sixteen times the focal size.

One of the most interesting places is the chronometer-room, in which chronometers are kept for the Royal Navy, and where others are upon

trial. The chronometers number between 150 and 160 in all, 40 of them belonging to makers who send them on the annual trial. A word or two of explanation may be given here in respect to the "Greenwich trials."

The Astronomer-Royal announces every autumn to "the trade" the latest day for receiving chronometers in the Observatory. Those makers who are known and recognised have no trouble; but a "new hand" will have to give references as to *bond-fide* respectability, &c. The instruments have to be delivered by the owner not later than the day named, when they are placed in the chronometer-room under the special charge of an assistant. They are regularly wound up, and their rates are taken from day to day, but they are otherwise not meddled with. Should one break down the owner is written to, and he removes it, but cannot re-enter it until the following year. The trials begin about the second week in January, and end in August, lasting about twenty-eight weeks. The makers then receive notice to take their chronometer away, and a tabulated report of the rate of such instrument is subsequently supplied to the trade by the Astronomer-Royal. No charge of any kind in any way is made for this supervision.

A few words on the personal establishment of the Observatory, and our survey will be complete.

The Astronomer-Royal has the co-operation of eight assistants; four of these are employed in the daily, or rather nightly, routine of observing; two in carrying on the observations and processes of the Magnetic Observatory, and two in other official or supervisory capacities. For aiding the assistants and performing the immense masses of computations that practical astronomy entails, a number of supernumerary computers, generally from eight to ten, are employed in the various departments. For facilitating the performance of the various computations, *skeleton forms* are provided, in which every step to be taken by the computer is printed on the margin of each page in the shape of a precept; now instructing him to add, now to subtract, now to take out a logarithm, and now to extract a correction from some table, "so that the computer can no more go astray than the visitor to the monument can quit the narrow stair that conducts him from the base to the gallery at the top; but no pleasant view nor grateful repose awaits him when he has toiled to the top, or rather to the bottom of *his* column.

His labour is Sisyphean; he begins just where he left off, without feeling himself either wiser or better for what he has done. Still, like the mason of the material building within which he is engaged, he has added one brick to the edifice of human knowledge, and grow it will, though unperceived almost by himself." Some idea of the amount and variety of the nature of the computations may be inferred from the circumstance that nearly 200 of these skeleton forms are in continual use throughout the various departments.

The office of the Astronomer-Royal is no sinecure; for in addition to the labour of directing the various branches of the intricate establishment under his control, his services are frequently laid under requisition in connection with scientific commissions of all kinds, on railways, sewers, lighthouses, national standards, and a hundred minor matters not immediately connected with his office, and involving him in a very considerable correspondence.

INDEX NOMINUM.

	PAGE		PAGE
A		B	
Abbot of Kirkstall...	1	Barton, Mrs. Catherine, <i>Note</i>	114-5
Adams, John	289	Bates, Roger	14
Airey, Geo. B , Astronomer-Royal	209, 319, 325	„ Rev. Dr. William ...	289
Allison, clergyman	121	Baystow, Elizabeth	248
Anderson, Rev. Mr., London ...	143	Baume, Isaac	235
Arbuthnot, Dr. John	47, 49, 54, 55, 103, 106, 167	„ Thomas	220
Archimedes, an ancient mathe-		Beigh, Ulugh	149
matician	168	Bentley, Dr.	109
Armine, Lady Mary	192	„ Richard	298
Armitage, Sir John	30, 235	„ Eli and Daniel	298
Arthington, Henry	202, 245	Berry, Rev. Elkanah	191
B		Bessley	94, 95
Bagnall, Elizabeth	7	Blackett, Sir Walter	305
Baily, Francis,	16, 34, 35, 36, 38, 39, 136, 150	Blackburn, Henry... ..	305
Bailye, William	220	Bliss, Dr., Astronomer-Royal ...	318
Balme, Abraham, <i>Note</i>	35	Bradley, Dr.	18, 318
„ Robert	235	Bradshaw, Henry	220
Balmforth, Miss	207	Brahe, Tycho	149
Barrow, Dr. John	76	Booth, Rev. Charles	8
Bartlett, Benjamin, surgeon, Brad-		„ Rev. Charles Swaine	8
ford, <i>Note</i>	67	„ Robert	8
„ Benjn., surgeon, London	67	Boyse, John, Bradford	241
„ Benjn., bookseller, Brad-		Brewster, Sir David	43, 150
ford	124	Bridges, Elizabeth (Stapleton) ...	252
„ Benjamin, apothecary,		„ Francis, attorney, Leeds	290
London	124	„ „ antiquarian, „	254-5
		„ „ Leeds and Horton	254
		„ Francis Sharp, Horton...	255
		„ Thomas, Leeds...	254
		„ Rev. William	254

	PAGE		PAGE
Briggs, Henry, Halifax ...	9, 11	Clarkson, Rev. Wm., Adel 6, 221,	
Brighthouse, Jasper, Martin, and		234, 235, 240, 281, 284, 286	
Richard, senior ...	310	Clinton, Hon. De Witt ...	201
Brooksbank, Rev. Abram ...	266	Cook, William ...	293
„ Abram ...	268	Cook, Rev. Dr. ...	132
Brooksbanks, landowners ...	184	Cornell, Samuel ...	293
Buckingham, Sheffield, Duke of	92	„ Susan ...	293
Bullialdus, astronomer ...	195	Cornwallis, Lord ...	233
Burgoyne, General ...	292	Crabtree, astronomer ...	77
Busfeld, Anne ...	256	Crewe, Lord Bishop of Durham...	272
„ Jane ...	256	Crompton, Joshua... ..	305
„ Richardson, Harden ...	256	Crompton, William Rooke (Stans-	
„ William, Ryshworth ...	304	field)	305
C		Crosthwait, Joseph 16, 34, 138, 145	
Calamy, Rev. Dr. ...	241	Crosthwaite, J. S., F.S.A., Adam	
Calverley, Sir Walter, Bart. 305, 306		de, Mary, Percival, Thomas,	
Camden, William, historian ...	93	Note	134
Carlisle, Lord Bishop of ...	93	Cudworth, Ralph ...	287
Cassini, John Dominic ...	71	D	
„ James, astronomer ...	71	Dawson, Rev. Eli ...	165, 166
Caswell, John, astronomer, Oxford		„ Rev. Joseph, Thornton... 165	
79, 96, 97		„ mathematician ...	164
Ceulen, Ludolph Van 127, 169, 170		Dean, Rev. John ...	195
Chads, Henry, R.N. ...	293	De Foe, Daniel ...	287
„ Sir Henry Ducie, G.C.B.... 293		Deighton, Alice ...	268
Challoner, Dr. ...	176	Dillenius, Note ...	27
Chantrey, F. L., sculptor... 276-8		Ditton ...	75, 112
Charles First ...	119, 219, 248	Dixon, Bryan ...	245
„ Second ...	109, 240	„ Captain ...	243, 244
Chelk, Lady ...	121	„ John, Bradford ...	244
Chester, Lord Bishop of ...	137	Dryden, Benjamin... ..	286
Cheyne, Dr., mathematician		Duckworth, William ...	252
32, 62, 66		E	
Christie, William H. M., F.R.S.		Evans, J. H., London ...	213-5
36, 319		Evelyn, John, F.R.S., Lewes ...	302
Chute, Rev. John, M.A. ...	199, 200	F	
Colson, mathematician ...	24	Fairfax, Lady	
Colton, Rev. Dr. ...	193	226, 227, 228, 230, 231-2	
Clarkson, Rev. David ...	6, 287-8	„ Sir Thomas, 7, 192, 227,	
„ John, Kirton ...	286	228, 229, 254, 266, 285, 287	
„ Mary Rutherford 292, 293		„ Lord Ferdinando ...	284
„ Matthew, New York,		Favour, Dr. ...	176
Lieut.-Colonel 292, 293		Fawcett, Rev. Dr. John ...	176
„ Robert ...	22, 284		
„ Robert, Fair-gap ...	282		

	PAGE
Fearnley, Shipley	208
" Susan	268
Ferrand, Richardson, Harden ...	304
Field, William	5
Finch, Sir Heneage	267
Flamsteed, Rev. John, 11, 12, 13, 16, 34, 39, 43, 49, 50, 51, 54, 55, 56, 57, 60, 61, 62, 64, 66, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 80, 81, 83, 85, 86, 87, 88, 89, 90, 91, 93, 94, 96, 97, 103, 104, 106, 110, 125, 126, 127, 128, 129, 131, 132, 134, 148, 149, 150	
Flamsteed, Mrs. Margaret, 132, 136, 137, 138, 139, 140, 143, 145	
Flamsteed's Executors, 138, 140, 146, 147	
Fothergill, Marmaduke	27
Foutenel, Mons.	148
Fourness, Thomas, Otley	311
Fowles, Sir Henry	226
Franklin, Benjamin	289
Frickleton, Christopher	267
G	
Gascoigne, William ... 71, 72, 148	
Gassandius... ..	71
Geers, Elizabeth	287
George, Prince of Denmark, 47, 48, 49, 55, 80, 81, 115	
Gifford, Major-General	226
Giles, Edmund, Esq.	8
" Mrs.	31, 34, 39
Gilpin, Ann (Kitchen, Giles, Sharp)	8
" Hannah (Booth)... ..	8
" John, Whitehaven	186-7
" William, Whitehaven	8
Godolphin	85
Goodall, Richard	245
Goodchild, W.	207, 208
Graham, Robert, London	120, 220
Greene, William	220
" Elizabeth	287
Gregory, Dr. David	47, 62, 70, 147
Gregson, M., Liverpool	256

	PAGE
Griffin, W., Portsmouth	21
Gurney, Bartlett, F.S.A.	67
" Henry, Norwich	67

H

Hailstone, Edward, F.S.A., 1, 35, 158, 160, 161, 171, 194, 211, 212, 242	
Haines, Major Bernard Gilpin, 35, 61	
" Mrs., London	8
" E. W., London	35
Halifax, Earl of	114, 115
Hall, John	83, 123, 165
Halley, Dr. Edmund, 24, 32, 33, 50, 51, 52, 54, 55, 71, 145, 165, 171	
Halliwell, J. O., London	176
Hammond or Hawmond... ..	2
Hammond, Ezra Waugh	160
Hardcastle, Rev. Joshua	195, 196
Harley, Rev. Robert, F.R.S.	35
Harrison, John	82, 83, 84, 113
Hawmondrode, Wm., sen. & jun. ...	2
Hayes, Dr.	69
Hearne, Tom, <i>Note</i>	27
Heineken, Rev. N. S., Sidmouth, 206-9, 210-12	
Hereford, Bishop	231
Hewley, Sir John	193
" Lady	192, 193
Heywood, Rev. Oliver	165
Hick, Dr., Guiseley	240
Hill, William	226
Hobbs	112
Hodgson, Captain, Halifax	223
" James ... 96, 97, 146, 147	
" Thomas (1589 & 1595) ...	5
Hogeson, Sir Robert	5
Holcraft, Sir John... ..	289
Holdsworth, John... ..	82, 83, 184
Horrox, Rev. Jeremiah	3, 77, 78
Horton, John	220
Hudson, J., mathematician,	62
" Jacob	252
Huygens, astronomer	71, 79

I

Ingham, Dorothy	245
------------------------	-----

	PAGE		PAGE
J		Markham, William, Becca Hall...	
Jackson, Whitehaven	201	Marots, Des	122
„ Christopher	202	Maryons Wyons, Lord of Stans-	
James, John, F.A.S., Historian of		field	295
Bradford... ..	212, 213	Maskelyne, Dr.	175, 177, 318
Jowett, William	220	Mather, Rev. Dr.	000
K		Maynard, Sir John	219, 220
Keile	96	„ Lady	220, 243
Kepler, John, astronomer	70, 95	Maud, Major, Bierley	285
Kennett, B., surrogate	202	Midgley, John	246
Kenrick, Matthew, London	290	Moivre, Mons.	32, 76, 79
Kent, Chancellor	293	Molson, Mary	6
Kilham, Whitehaven	201	Molyneux	64
King George the First		Montagu, Charles, Earl of Halifax	
113, 119, 146-7		114-5	
King William the Third	291	Moor, Sir Jonas 39, 40, 41, 95, 99	
Kirke, Cookridge	66, 67, 92	Morden, Sir John	71, 72
Kitchen, Mrs. Ann	8	Moulson, John	301
Kitching, John	253	Mountain, Thomas	244
„ Mary	253	Mudd, Captain	226
Knapp	116, 117	Murgatroide, John	244
L		N	
Lacy, Richard, Lord of the Manor	5	Nalson, Rev. John	6
Law, William	5	Napier, Lord,	25, 175
Leach, John	253	Nettleton, Dr. Thos., Halifax	312-6
Leigh, mathematician	65	Newall, John of	2
Leventhorpe or Lewenthorpe,		Newcastle, Earl of 225, 226, 288, 289	
Lord of the Manor	1, 2	Newton, Sir Isaac 42, 43, 44, 46,	
„ Geoffrey	2	47, 48, 51, 57, 84, 85, 95, 96,	
Lister, Abraham	264	147, 150-1	
„ Rev. Accepted	191	Nicholls, landowner	184
„ Joseph, Historian of the		North, Joshua	253
Siege of Bradford	224	Northrop, John	251
„ Martha	246	O	
„ Samuel, attorney, Bradford		Owen, Dr. John, Puritan... ..	289
200, 252		P	
„ Thomas, Manningham	254	Page, printer, London	182
Lhwyd	27	Palmer, William,	268
M		Parker, Author of The Ephemeris	121
Machin	145	Parkinson, David	236
Manchester, Earl of	287	Parsons, John	24, 25
Mansfield, Lord Chief Justice	276	Pierre, St.	40
Markham, Archbishop	305	Pond, John, astronomer	319
		Popeley, Mary	250

	PAGE
Pound, Mr. ...	16, 130, 135, 139
Powell, Rev. Benjamin, Belling-	
ham Lodge, Wigan ...	255
" Francis Sharp, M.P.	
6, 7, 12, 160, 161, 162, 255	
" Rev. Thomas Wade ...	255
Priestley, Rev. Nathaniel	165-6
Prince, Alex. ...	253
Pudsey, Elizabeth... ..	306
Pulley, Thomas	252
Purcell, Conyers	112

Q

Queen Anne ...	76, 99, 125, 269
----------------	------------------

R

Raine, Rev. Canon, York ...	211
Ramsay, Sir John	272, 274
Ramsden, Jesse, Salterhebbles and	
London	176
Raphson, Joseph	24, 32, 97
Raymer, Captain	68
Rhodes, Jeremiah	244
" John	250, 251
Richardson, Dr., F.R.S., Bierley	
9, 26, 27	
" Mrs. Jane ... 9, 30, 31	
" John, attorney ... 265	
" Thomas	235
" William, lecturer 212-4	
Riddlesden, Richard and Samuel	311
Ridgley, Rev. Dr.	290
Roberts, Francis	47, 147
Robinson, John	253
Rogers, Colonel	225
" Anna Maria (Crompton) 305	
Rookes, Wm., Royds Hall 305, 308	
Rowley, Walter, Esq., F.G.S. ...	166
Rupert, Prince	227
Ryley, Greenwich... ..	98

S

Sale, Faith... ..	7, 245-6
" Rev. James	7
Saltenstall, Gilbert	310
Sands, Sir William and Lady	291
Savile, Sir George	250

	PAGE
Savile, Sir William ...	221, 222
Sawrey, Richard Gilpin ...	201, 251
Sharp, Abraham 1, 8, 9, 11, 161,	
162, 164, 165, 168, 169,	
170, 171, 175, 263, 264	
" Christopher	2
" Granville	261, 275, 277
" Isaac	245, 249
" Isabel	2
" John, Horton	2, 5
" John, M.D., ... 7, 27, 28	
" Rev. John, Archbishop of	
York	262, 269, 270
" Rev. John, M.A., Horbury 265	
" Lieutenant	250, 251
" Mary (<i>Marie</i>) 238, 239, 240	
" Samuel	6
" Thomas, Archdeacon of	
Northumberland, &c. 271-4	
" Thomas, the elder 10, 247	
" Thomas, the junior 245, 247	
" William, F.R.S., Rugby ...	265
" W., surgeon, London ...	174
" William, M.A., Mareham 265	
Shaw, William	9, 10
Sherrard, Consul	27
" Dr. James	27
Sherwin, Henry ... 151, 171, 172, 174	
Shrewsbury, Earl of	192
Siddall, John	251
Sikes, Rev. T. B., Burstow ...	132
Skelton, Christopher	211
Sloane, Sir Hans, 27, 99, 106, 111, 125	
Smeaton, John	167, 168
Smith, Hannah	250
" Rev. John, Mixenden	
194, 252, 253	
" Rev. Matthew, Mixenden 250	
" Rev. Dr Thomas... ..	176
Snowdon, James	268
Sorcy, Mons.	122
Speidell, Euclid	24, 25
Stafford, J., amanuensis	14
Stanhope, Samuel... ..	311
Stapleton, Dorothy	252
" Elizabeth	200, 246

	PAGE
Stapleton, Francis, 200, 251, 252, 255	
„ Mary	251
Stansfeld, James	296, 297
„ Joshua	296, 299, 300
„ Josias, Sowerby,	
297, 298, 299	
„ Nicholas	296
Stansfeld, Elizabeth	245
„ Faith	245
„ Robert, sen.	303, 304
„ Robert, jun.	304, 305
„ Samuel	244, 302
Stretton, Rev. Richard	192
Sugden, Jo.	236
Swaine, Dr.	164
„ H. P., Brabœuf Manor... ..	165
„ Robert	235
„ Thomas	245
„ William	235
Swayne	184

T

Taylor, William, London... ..	286
Tempest, Elizabeth, Nottingham	311
„ John	312
„ Rev. Robert	311
Thompson, Henry	306
Thoresby, Ralph, antiquarian,	
Leeds, 27, 51, 114, 165, 245, 254,	302
Thornhill, Sir James	140
„ Sir John	296
Thornton, Ezra	252
Thorp, Dr.	127
Tillotson, Dr. John, Archbishop	
of Canterbury	268, 269, 288
Tolard	82
Topham, John	202
Turner, H. H., M.A.	319
Tyersall, William of	2

U

Usher, Archbishop	176
Uxdale	27

V

Vandergucht	140, 141
Vertue	142

W

	PAGE
Wade, Rev. Thomas, Bierley	255
Wainhouse, Rev. Nathaniel	30
Wainman, Richard	251
Walker, Henry	248
Wallis, Dr. John, 45, 46, 171, 172, 174	
Walpole, Sir Robert	137
Warburton, surveyor	128
Ward, Dr.	176, 207
Washington, General	292
Waterhouse, John, F.R.S., Hali-	
fax, <i>Note</i>	207-8
„ Rev. Jonas	156
„ Richard, Shelf	248
Weddell, John, Widdington	265
„ John, attorney	265
Wesley, W. H., Astronomical	
Society	35
Wheler, Sir G.	268
Whewell, Dr. Wm.	46, 150
Whiston	65, 112, 145
Whitaker, Dr., historian	254
„ Dr. W., London 313-4, 316-7	
White, Mr.	60, 62
Whitley, John, Hipperholme	310
„ Nathan, Rookes	311
Wilson, Rev. W., D.D., Oxford... ..	254
„ Susan	283
„ Matthew	311
Wingate	174
Witty	174
Wood, Humphrey... ..	2
„ Thomas	4, 5
Woodhall, Isabel	286
Woodward, Dr.	51
Wooferman	98
Wren, Sir Christopher	
40, 41, 46, 47, 82, 147	
Wright, C. B. E.	211
„ Rev. Godfrey	211

Y

Yarwell, John, London	30, 31, 120
York, Duke of	71
Young, Elizabeth	250
„ William	250, 252

INDEX LOCORUM.

	PAGE		PAGE
A		B	
Adel, near Leeds	6, 7, 154, 190, 221, 234, 240, 284	Baildon	... 304
Adwalton Moor	... 298	Bamburgh Castle	... 272-4
Agbrigg	... 250	Barnstaple	... 228
Albany	... 291	Basingstoke, Hants	... 289, 290
All Saints' Church	... 162, 256	Bath	... 227
Amsterdam	... 142	Batley	... 194
Askwith	... 248	Beeston	... 245
		Bellingham Lodge	... 255
		Beverley	... 6
		Bierley Hall	... 26, 27
		Bingley	... 304
		Blenheim	... 177
		Bolton Hall, near Clitheroe	... 211
		Boulogne	... 305
		Bowling Hall	... 221
		Bradford	... I, 221-9, &c.
		„ Grammar School	9, 27, 238, 266, 287
		Bramley, near Leeds	... 251
		Bristol	... 227
		Broughton	... 77, 195
		Broughton Tower	... 186, 303
		Burley Woodhead	... 8, 245
		Burnley, Lancashire	... 296
		Bury, Lancashire	... 255
		Burstow, Surrey	... 41, 132
		C	
		Calverley, near Leeds	... 262
		Cambridge	... 44, 84, 85
		„ Christ's College	... 266
		„ Clare Hall	... 7, 238, 239
		„ St. John's College	... 255
		Carolina, North	... 293
		Charleston	... 292
		Chester	... 104
		Chepstow	... 230
		Christ's Hospital, London	24, 41
		Clitheroe	... 211
		Coley Chapel, near Halifax	... 154
		Cookridge, near Leeds, <i>Note</i>	... 92
		Cornwall	... 228
		Corpus Christi College, Oxford	... 43
		Crayford, Kent	... 290
		Crediton	... 228
		D	
		Dartmouth	... 228, 229
		Derby	... 13, 149

	PAGE		PAGE
Devonshire	229	Kirton, Nottinghamshire...	281
Dewsbury	222	Kirkleys (Kirklees) ...	235
Dublin	177	Kirklington, North Riding	284
Durham	271, 272, 275		
E		L	
East Ham, Essex	289	„ 20, 76, 200, 211, 221, 225,	
Elland	296	241, 250, 254	
Esholt Hall Estate 304, 305, 306, 307		Leeds Castle	232
Eshton	311	Leyden	7, 26, 27, 28
Exeter	228	Liverpool	11
		Long Preston	304
F		M	
Felliskirk	254	Manningham	253, 254, 282
Fulham	276	Mareham, Lincolnshire ...	265
		Marston Moor	77, 227
G		Middleton, Yorkshire, <i>Note</i> ...	77
Gotha	177	Mill Hill Chapel, Leeds ...	241
Grassington	264	Mirfield	250
Greenwich Observatory		Mixenden	251, 252
12, 14, 18, 29, 76, 145, 318-328		Morley	241, 250
Gresham College ... 25, 102, 111, 175		Mortlake	291
Guiseley	240		
„ Church	304	N	
		Newark-upon-Trent	302
H		New York City	292, 305
Hague, The	70	„ Colony	232
Halifax 11, 175, 176, 222, 223, 224		North Bierley	263
Harden	304	Norwood Green	308
Hartburn	272-4	Nun Appleton	232
Haworth	235, 309		
Hexham	272	O	
Hipperholme	300, 308, 310	Otley	305
Horton Hall 7, 26, 34, 39, 59, 64,		Ovenden	165
154, 158, 160-4, 227		Oxford	148, 229
„ Old Hall	12, 151, 250		
Horsforth	245	P	
Howley Hall	194	Padua	177
Hull... ..	232, 233	Paris	177
Hurst, Lancashire... ..	290	Parkhouse, North Bierley	264, 265
		Peterborough	240
I		Plymouth	229
Idle, near Leeds	304	Pontefract	305
		Portsmouth	18, 20, 21, 22
K		Preston	119
Kent	290	Pudsey	7
Keswick, Cumberland, <i>Note</i> ...	134		

R				PAGE	U				PAGE
Raglan Castle	...	...	...	229	Utrecht	...	...	...	152
Rotterdam	...	...	...	142					
Royds Hall...	...	...	...	305					
Ryshworth, Bingley	...	...	...	307					
S					V				
Scalby, Cumberland	...	...	...	187	Victoria University	...	...	...	256
Sedbergh Grammar School	...	...	...	255					
Selby	...	...	...	223					
Setnabannick, now Setmabanning	...	...	...	134					
Sheffield	...	...	...	311					
Sidmouth	...	...	...	206, 209					
Silkstone	...	...	...	30					
South Kirkby	...	...	...	250					
Sowerby Dean	...	...	...	297					
Steeton	...	...	...	232					
Stepney	...	...	...	289					
T					W				
Thornhill	...	...	...	221	Wakefield	...	...	2, 221	
Tiverton	...	...	...	228	Walkington, near Beverley	...	...	...	6
Todmorden	...	...	...	295	Wallingford	...	...	...	229
Tong	...	...	...	311	Walton Hall	...	...	2, 158	
Tottington, near Bury	...	...	...	272	Whitehall	...	...	...	249
Tyersall	...	...	...	2	Whitehaven	...	...	8, 186, 201	
					Wibsey	...	...	...	310
					Widdington	...	...	...	265
					Wigan	...	...	...	255
					Wigan Grammar School	...	...	...	255
					Woodhouse, North Bierley	...	...	...	264
					Worcester	...	...	...	229
					Worksop, Derbyshire	...	...	...	111
					Y				
					Yeadon	...	...	...	305
					York City	...	9, 10, 11, 185, 207,	305	
					Yorkshire College, Leeds	...	...	...	256

GENERAL INDEX.

A	PAGE	PAGE
Anecdote of Snetzler on the organ playing of Herschel and Wainwright	177-8	Bradford Town and Trade till after the Commonwealth, chiefly farming and clothmaking ... 1-9
Antiquity of the Sharp Family and its two branches	1	Bradford "Kersies" much prized 221
Armour worn during the Civil Wars, still preserved at Horton Old Hall... ..	249	Bradford, Yorkshire, the metropolis of the worsted industry 1, 184
Arcus Meridionalis, Drawing of... ..	17	Bradford, Sieges of, during the Civil Wars 221, 226
Aurora Borealis described by Sharp, 69-70; Flamsteed's observations, 71-2; Sharp's further account	72-3, 123-5	Briggs, Henry, born near Halifax about 1556; Fellow of St. John's College, Cambridge; first Savilian Professor of Geometry at Oxford; afterwards settled at Merton College, where he lived the life of a recluse, but devoted to scientific pursuits and the duties of his office the rest of his life; he was long a correspondent of Archbishop Usher 175-6
B		C
Bentley Family:		Calverley, Sir Walter, acquired the Esholt Estates by marriage; he demolished the Priory and erected the modern mansion early last century; remains of the Priory Church ... 305-6
Timothy, Eli, Daniel	298	Ceulen Van, a Dutchman, and the problem of "Squaring the Circle" 169
Daniel, curate of Sowerby	298	
Eli, vicar of Halifax	298	
Booth, Charles Swain, son of the Rev. Charles Booth, of Bradford	8	
Bradford Grammar School, distinguished pupils—Abm. Sharp, Archbishop Sharp, and Dr. Richardson, 9; Rev. Thomas Sharp, M.A., 238; and David Clarkson	287	

	PAGE
Clarkson Family, formerly of Bradford	281, 293
Clarkson, Matthew, emigrated, but returned soon afterwards; appointed Secretary of New York, out of respect to his father's memory	291
Clarkson, Matthew, a great-grand- son of the Secretary N. York, served under Arnold and Lin- coln as a major, witnessed two severe reverses, and two of the most brilliant victories, and be- came afterwards Under Secre- tary of State	292
Congregation of Horton Meeting- house principal members ...	190
Contemporary landowners, Hor- ton	184

D

Dean, Rev. John, minister of the Presbyterian Chapel from 1768 to 1813, which, during this time, became Unitarian	195
---	-----

E

Eccentric Chuck, Description and Plate of	214
Esholt Hall Estate, purchased in 1755 by Robert Stansfield from Sir Walter Blackett, the second Baronet; marble monument in Guiseley Church	304-5
Esholt Priory, granted to Henry Thompson, of Boulogne ...	302
Evelyn, John, F.R.S., Lewes ...	302

F

FAC-SIMILES :

Abraham Sharp's Shorthand ...	37
Ancient Deed, dated 1391 ...	3
Flamsteed's Signatures ...	60

FAC-SIMILES—continued.

	PAGE
Flamsteed's Handwriting ...	129
Letter Address to Faith Stans- field, 1717	185
Letter from Dr. Ed. Halley, 1705	33
Letter to Richd. Gilpin Sawrey, October 24, 1729	188
Title page of Geometry Im- proved, Polyedra, &c., by A. S. (1717)	179
Title page of Mathematical Tables by Briggs, Wallis, Halley, and Abraham Sharp, 1705-6	173
Fairfax Medal and Certificates awarded to John Sharp	231-2
Faith, a favourite Christian name, as Faith Sale, 7; Faith Stans- field, 8; Faith Sharp, 245; Faith Sawrey	241
Finch, Sir Heneage, Solicitor- General	267
Flamsteed, his rupture with Sir Isaac Newton and Dr. Halley	43-46
Flamsteed, Rev. John, Portrait of face	48
„ Baily's account of ...	39
„ appointed Astrono- mer-Royal... ..	40
„ specimen of his hand- writing	129
Flamsteed's Signature	60
Funeral Expenses on Dr. John Sharp	27-28

G

Gateway from Howley Hall, Sketch of	193
“Geometry Improved” (by A. S., Philomath), Fac-simile of Title	179
Greenwich Observatory, descrip- tion of	318-322
Greenwich Observatory, Drawing of Great Equatorial	320
Greenwich Observatory, Drawing of Reflecting Telescope ...	321

	PAGE
H	
Halley's letters to Abraham Sharp	25-33
Heywood, Rev. Oliver : Extracts from his Diary 298, 299, 300, 302	
<i>Historia Cælestis</i> , Publication of frequently interrupted ...	49-51
<i>Historia Cælestis</i> , Abraham Sharp and Joseph Crosthwait com- plete vols. 2 and 3 ...	133-147
<i>Historia Cælestis</i> by Flamsteed, Description of ...	148, 150
<i>Historia Cælestis</i> , Halley's spurious edition of ...	122, 137
Holcrofts of East Ham and Val Royal ...	289-290
Horton, Aurora Borealis seen at	69, 117, 124
„ Deed of 1391, Fac-simile	3
„ Latitude of ...	64
Horton Hall, Description of	161-2
„ Sketch of— <i>Frontispiece</i> .	
„ As it was, Sketch of	163
Horton Old Hall, Drawing of south front ...	face 250
Horton Old Hall, Interior of Hall, Drawing of ...	face 257

LLETTERS *from*

Bishop of Carlisle to Ralph Thoresby ...	51
Crosthwait, Joseph ...	16, 18
Flamsteed, Mrs., to Dr. Mather, Oxford... ..	137
Flamsteed, Rev. John ...	28, 130
Flamsteed to Dr. John Arbuth- not	49-50
Flamsteed to Sir Chris. Wren	42
Newton, Sir I., to Flamsteed	44, 48
LETTERS <i>to Abraham Sharp from</i> —	
Bartlett, Benjamin ...	180
Crosthwait, Joseph ...	131, 190
Flamsteed, Rev. John ...	61, 130
„ Mrs. Margaret ...	134

	PAGE
LETTERS <i>to Abraham Sharp from</i> —	
Halley, Dr. E.	25, 33
Mount, Richard... ..	180-1
Parsons, John	24
Raphson, Joseph	32
Sawrey, R. Gilpin	195-6
Sherwin, Henry... ..	172-4
Speidell, Euclid... ..	24-5
Wainhouse, Rev. N.	30
Yarwell, John	31
Longitude, Finding of ...	109, 113

M

MARRIAGE SETTLEMENTS :

Stansfield, Joshua, and Sharp, Martha	299
Stansfield, Robert, and Sharp, Elizabeth	303
Memorials of the Sharp Family	220, 278
Mural Arc, Description of	14-16

N

Nettleton, Dr. Thomas, of Halifax, Curious correspondence on inoculation	312-317
Newton, Sir Isaac 76, 78, 102, 105	
„ The <i>Principia</i> 66, 76, 85, 108	

O

Odometer, invented by A. Sharp	59
--------------------------------	----

P

Pedigree and Coat of Arms of the Sharp Family of Horton	face 7
Pedigree and Coat of Arms of Francis Sharp Powell, M.P., of Horton Old Hall ...	face 247
Pedigree of Archbishop Sharp	260
Pedigree and Coat of Arms of the Clarkson Family, formerly of Bradford... ..	face 280
Pedigree and Coat of Arms of the Stansfeld Family	294

	PAGE		PAGE
Pocket Books from 1684 to 1734 ; in the possession of Messrs. Hailstone and Powell 12, 14, 19, 21, 22, 27, 28, 29, 30		Sharp, Abraham, his attempt at "squaring the circle"...	169
Portrait of Abraham Sharp	face 151	„ Constructs the Mural Arc at Greenwich Observa- tory	14
Portrait of Rev. John Flamsteed	face 48	„ Specimen of his minute calculations	159
Presbyterian Chapel, Bradford	193-197	„ Specimen of his shorthand	37
		„ Death and funeral of	197-8
		„ Inventory of his instru- ments	203-5
R		Sharp, John, Parliamentarian, had a family of ten children ; his two most distinguished sons were Thomas Sharp, M.A., Vicar of Adel, and Abraham, the mathematician and astron- omer, and another son entered Clare Hall, Cambridge, but died in his seventeenth year ...	7
Ralph Thoresby, the Yorkshire antiquary	114, 192	Sharp, John, the Parliamentarian, and Secretary of Fairfax	219-236
Ramsden, Jesse, born at Salter- hebble, and afterwards settled in London, a noted mathematical and astronomical instrument maker ; inventor of Dividing Engines, which soon superseded hand labour ; made the Theo- dolite used in Royd's English Survey ; elected a Fellow of the Royal Society, and awarded the Copley Medal for his inven- tions, and died at Brighton in 1800 ; his father, a nephew of Abraham Sharp...	176-7	„ Certificates and medal granted to ... face	231
Rebellion of 1715, Effect of at Horton	119	Sharp, John, the Royalist, Family of	247-258
Rookes Family, of Rookes and Royds Hall	308-310	Sharp, Thomas, M.A., rector of Adel	237, 246
		Sharp, Dr. John, a student at Ley- den	26
S		„ His premature decease ...	27
Sawrey, Dr. Wm., Newcastle, Dr. Nettleton, of Halifax, and Dr. Whitaker, London, on inocula- tion	312-6	Sharp, Archbishop John, a native of Bradford	262-3
Sawrey, Mrs., and Mrs. Jane Stansfield	306-7	Sharp, Archbishop, his family	260-278
Schaick, H. Geritse Van...	291	Sharp, Granville, the distinguished philanthropist	275, 278
Sharp, Abraham, his early life ...	9	Sherwin's Mathematical Tables, Fac-simile of title	173
„ Portrait of face	151	Singular Thanksgiving Day	298, 299
„ Indenture of apprentice- ship	9	Stansfeld Family, of Stansfield	296, 307
„ Appointed assistant to Flamsteed	13	Stansfeld Family : its wide con- nections, 296 ; name first altered in the spelling by Samuel, the third son of Josias, of Breck ...	298

	PAGE
Stansfeld, James, of Stansfeld Pond, a wealthy clothier ; extract from will	297
Stansfield, Robert, a wealthy dry-salter ; his son Robert purchases Esholt Hall	303-5
Sun-dial made by Sharp, Sketch of	166

T

Thomas Sharp, father of Archbishop Sharp, a resident of Ivegate	266
„ His lands and estate at Bradford	267
Thomas Swain, salter, of Bradford	144-233

W

	PAGE
Wainhouse, Nathaniel, lecturer at the Bradford Parish Church	30, 260
Whitaker, Dr., London	313-14
WILLS AND BEQUESTS :	
John Sharp	4
Thomas Sharp	5
Mrs. Sawrey	8
Abraham Sharp... ..	201-2
John Sharp	235-6
Thomas Sharp, M.A.	244-5
Faith Sharp	245-6
Isaac Sharp	351
James Sharp	264
Thomas Sharp, father of Archbishop Sharp	267-8

WORKS BY THE SAME AUTHOR.

ROUND ABOUT BRADFORD:

A SERIES OF SKETCHES, DESCRIPTIVE AND SEMI-HISTORICAL, OF FORTY-TWO PLACES WITHIN SIX MILES OF BRADFORD.

"The descriptions and sketches are very well written, and the balance of interest is always maintained."—*Manchester Examiner*.

"Mr. Cudworth has rescued from oblivion many interesting facts which but for his industry would have been lost, and has written these sketches in a sufficiently light and pleasing vein, and with a certain amount of quiet humour, that will render the book attractive to others besides those who reside 'Round About Bradford.'"—*Leeds Mercury*.

"Mr. Cudworth has made this subject his own, and unless we are much mistaken, his name will be long and widely known in connection with the district 'Round About Bradford.'"—*Bradford Observer*.

RAMBLES ROUND HORTON:

(HISTORICAL, TOPOGRAPHICAL, AND DESCRIPTIVE.)

"Mr. Cudworth is much to be praised for his work. We have but a thin and feeble literature of this kind."—*Athenæum*.

"This carefully printed and in every way satisfactory volume is one of the most interesting of late additions to the topographical literature of Yorkshire, and does the highest credit to the compiler."—*The Reliquary* (Llewellyn Jewitt).

HISTORICAL NOTES ON THE BRADFORD CORPORATION.

"An acceptable contribution to local literature."—*Leeds Mercury*.

"The work is one which places permanently and compactly on record the leading events of local history, with a mass of details which, regarded in a local light, must always be of interest."—*Yorkshire Post*.

BRADFORD: THOS. BREAR & CO., LIMITED.

COLUMBIA UNIVERSITY LIBRARIES



0315022374

01350374

925.H122
C 1889

CUDWORTH

